March 22, 1948

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STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

EDITORIAL INDEX, PAGE 27

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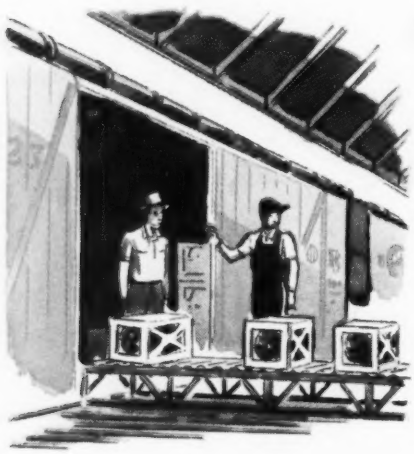

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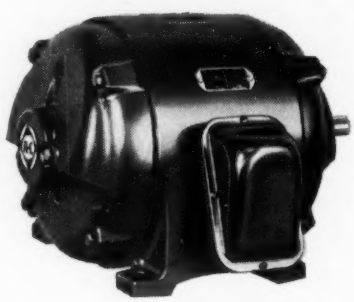

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Selecting Proper Oils for Quenching and Tempering

Raw Material Handling at Timken

How J & L's Fast Cold Strip Mill Is Lubricated

STEEL

The Magazine of Metalworking and Metalproducing

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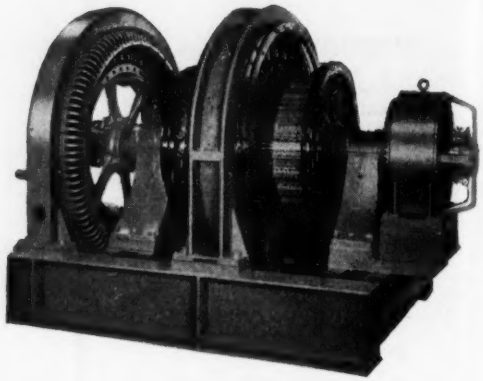

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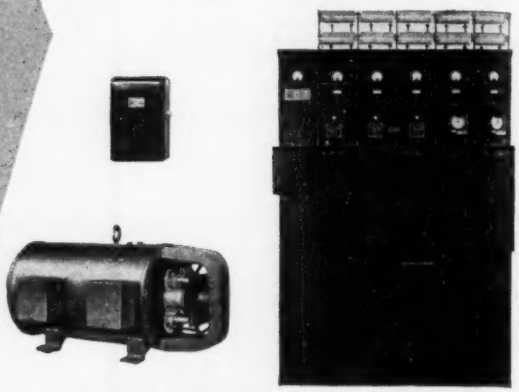

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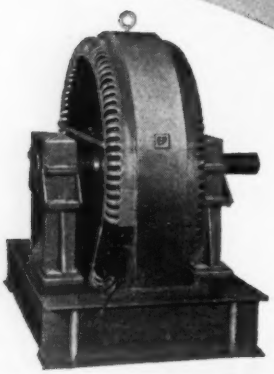

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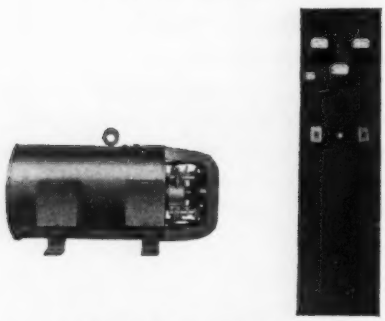

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March 22, 1948

Inconsistent!

On March 12 John L. Lewis issued a statement calling upon soft coal miners to express their "reaction" to what he called the "dishonoring" by coal mine operators of an agreement on pensions. Last week a majority of miners responded to this call by remaining away from the mines.

Whether or not this technically constitutes a strike is immaterial. The important point is that coal production is seriously curtailed at an inopportune time and as a result of a particularly flimsy pretext cooked up by a man who has repeatedly disregarded public opinion and the national welfare.

Almost as outrageous as the effrontery of Mr. Lewis in this instance is the curious failure of President Truman, several executive departments, the Joint Congressional Economic Committee, many usually vociferous politicians and numerous editorial writers and radio commentators to voice a protest against the action of Mr. Lewis. Their relative silence in the coal mine shutdown is in sharp contrast to the spontaneous and vehement criticism they hurled against steel companies when they raised prices on semifinished steel about a month ago.

This inconsistent reaction is all the more pronounced when one considers the circumstances of the two situations. The hike in steel prices was criticized chiefly on the score of its bad timing and of its psychological effect. Nobody ever claimed it to be a premeditated attempt to disregard the public interest. Its actual influence upon inflation was indirect and limited.

On the other hand, the coal mine shutdown was premeditated. It was cunningly planned to create the maximum disturbance at the worst possible moment. Its effect upon inflation will be direct and serious, because if the mines remain idle much more than a week steel production will be lost and supply will lag even farther behind demand, thus intensifying inflationary forces. It will place the nation in an extremely embarrassing position before the eyes of the world at a time when we should be exhibiting unity of purpose and action.

Reluctance of the government administration and of leading spokesmen of both political parties to protest vigorously against repeated Lewis arrogance is an evidence of impotency against powerful minorities which must be remedied before this nation can achieve economic stability.

* * *

TOOL SHOW IS TIMELY: If the millions of Americans who listened to President Truman's message to Congress last Wednesday could have gone immediately thereafter to the Tool Engineers Industrial Exposition in Cleveland's Public Auditorium, they would have witnessed many things that have an important bearing upon the world conditions which Mr. Truman discussed.

Exhibited at this show by 300 manufacturers were machines, tools, and accessories which have the potential to implement the European Recovery Program and any other rehabilitation project that may become necessary to put the world back on a foundation of economic stability. In short, the physical facilities exhibited at the show, coupled with the organization and "know how" that goes with the utilization of these facilities, constitute a powerful influence for peace.

At the same time, it must have been apparent to everybody attending the Cleveland exposition that the tools displayed actually are the postwar improved counterparts of the tools that,

(OVER)

AS THE EDITOR VIEWS THE NEWS

serving in America's "arsenal of democracy," helped to win World War II. In the remote event that war should break out again, these tools represent an asset of tremendous importance. No conceivable enemy could match them in quantity or quality in a period short of a decade.

Lastly, these tools, complementing the machines shown at the Chicago show last year, will help cut production costs—an extremely important factor in our domestic battle against inflation.

It was a timely show. —p. 35

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Report of the Department of Justice is inconclusive. It merely enumerates the sequence of price actions by the various companies and declares further investigation would be necessary to determine whether or not there has been violation of anti-trust laws. The Department of Commerce presents considerable factual information showing that steel prices are not as far out of line as prices of many other commodities and that steel profits, while high on some counts, are below those of all manufacturing companies on others.

Report by the Council of Economic Advisers concludes by stating "the steel price action forces upon our attention the fact that inflationary influences are still strong. If this inflationary trend is to be halted without broad use of public powers, all those who occupy strategic positions in the setting of prices, in the fixing of wages and in the granting of credit must recognize the public interest in their private economic decisions in a way the steel industry has not shown in this instance." —p. 40

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ASKS LIMIT ON TAXES: Writing in "The Clarkson Letter," William E. Robinson, vice president, New York Herald Tribune, describes a hypothetical case illustrating the destructive effect of the present tax system.

A wealthy man was considering the investment by him and his associates of $30 million in an undertaking which would provide a gross profit of $2,500,000 annually. After corporate taxes of about a million dollars, net profit would be $1,500,000. If this were distributed as dividends, the investors, being in the 85 per cent tax bracket, would pay $1,270,000 in income taxes. Thus the government would take $2,270,000 in corporate and income taxes whereas the investors would receive only $230,000.

It is this sort of thing that prompted Alfred P. Sloan Jr., chairman of General Motors, to urge a 50 per cent limit on the aggregate tax on business profits and individual incomes. He joins many others in stressing the point that excessive taxes are drying up the equity capital which industry needs so badly at the present time. —p. 50

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3 NEW STEEL STATES: Wartime expansion caused a moderate dispersion of steelmaking facilities and strengthened the position of several western and southern states. Today there is ingot capacity in 27 states, whereas at the time of Pearl Harbor only 24 states had steelmaking facilities. The three new steel producing states are Utah, Oregon and Tennessee.

Present rank of the 12 leading states in order of tonnage of steelmaking capacity is Pennsylvania, Ohio, Indiana, Illinois, Maryland, New York, Alabama, Michigan, West Virginia, California, Utah and Colorado. Capacity still is heavily concentrated in Pennsylvania, Ohio, Indiana and Illinois, which four states account for 70.3 per cent of the nation's steel ingot capacity. —p. 52

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WORKING IN COMFORT: A Pittsburgh company has developed a crane cab cooler. Cab roof and walls are insulated with fiber glass. A steel heat shield is suspended below the floor. Freon 114 is the refrigerant in an air conditioning unit into which air is introduced through two filters and activated carbon canisters for removing noxious fumes. In winter the air passes over electric strip heaters. Cab temperature is maintained at 80 degrees.

This is a far cry from the earlier attempts to cool crane cabs with ice or circulating water. It illustrates how improved methods and materials can be used to make jobs more comfortable. —p. 82

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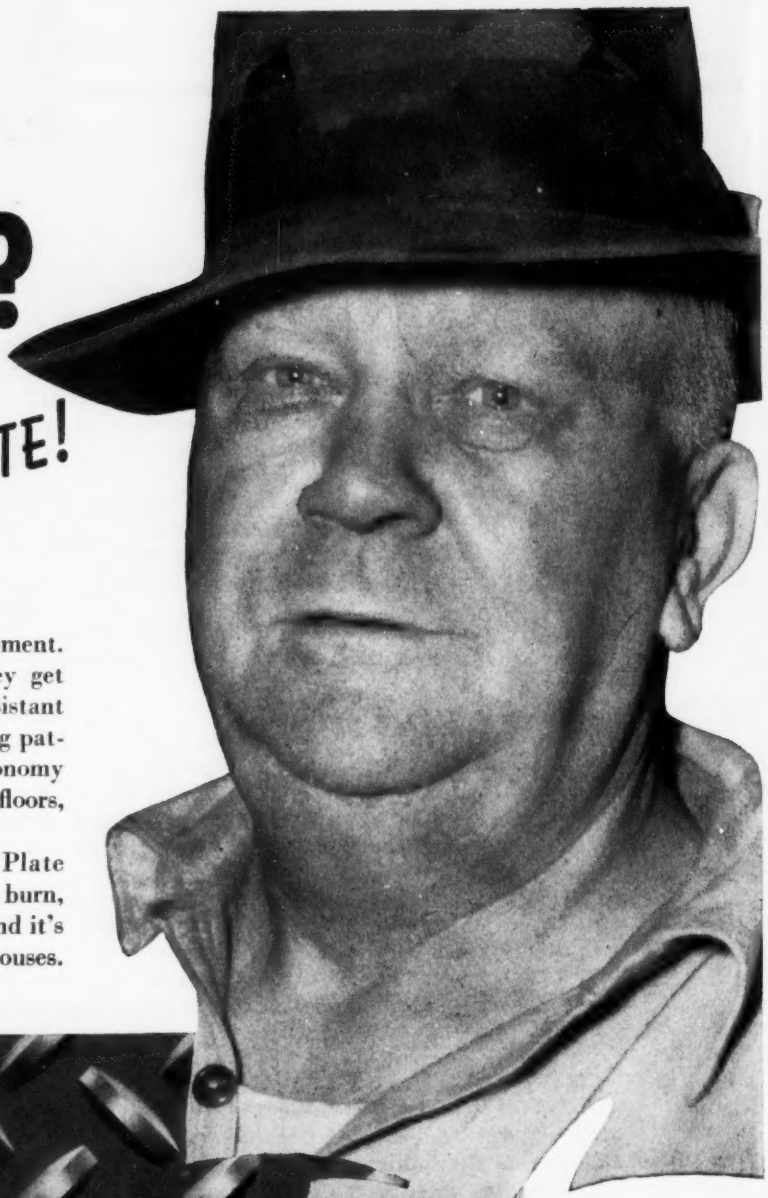

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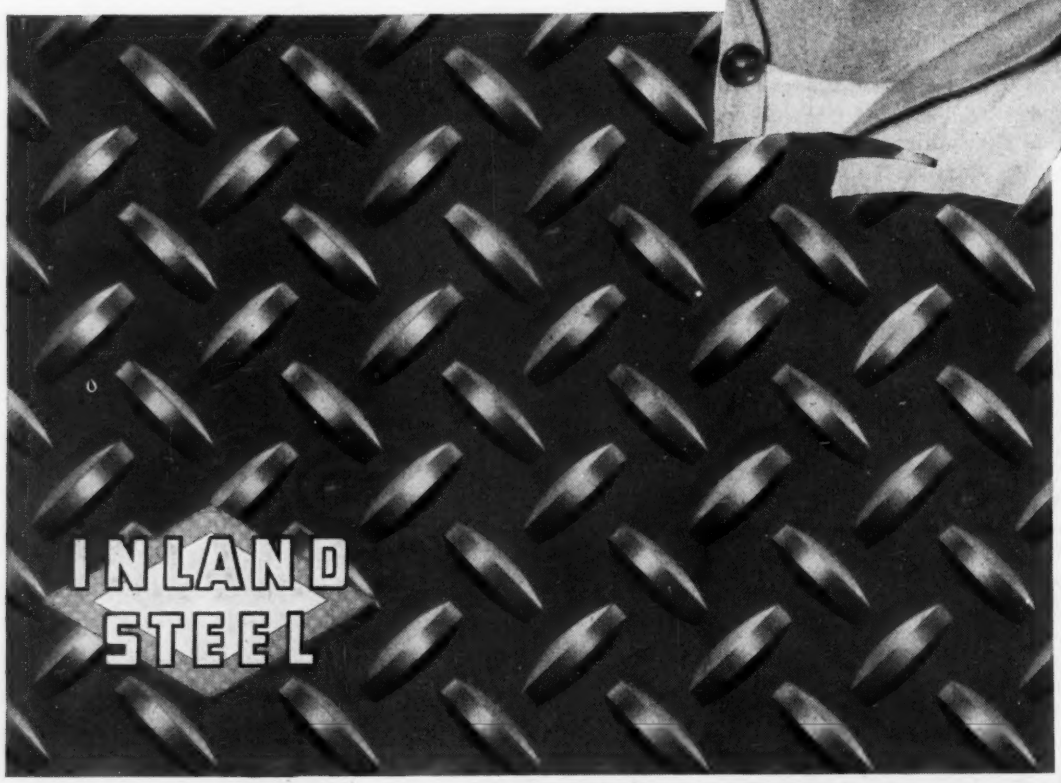

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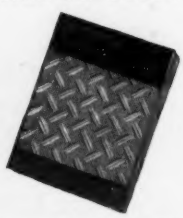

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INLAND 4-WAY FLOOR PLATE

More than 300 exhibits, a few of which are shown above, displayed latest equipment in the Tool Engineers Exposition at Cleveland's Public Auditorium

ASTE Exhibits Reveal Progress in Tooling

Bad news from Europe counterbalanced in some degree by fact machines, tools, gages and metalworking techniques give nation's militant policy for preservation of democracy firm industrial foundation

CLEVELAND — Tool Engineers Industrial Exposition, which drew attendance of more than 30,000 metalworking executives, engineers and technicians during the week of Mar. 15, proved to be extraordinarily well timed.

In view of the rapidly worsening political situation abroad, it is comforting to know that great strides have been made since the summer of 1945 in the improvement of the ways and means of producing interchangeable mechanisms faster and better than during the war years.

The things displayed at Cleveland's Public Auditorium by 300 leading manufacturers of machines and tools for mass production were not developed with military needs in mind, but no great stretch of the imagination is required to understand their great importance, not only in implementing the Marshall Plan but also in backing up that plan with something stronger than forceful words.

Equipment Available — The big show proved that tools, accessories and attachments now are available to get 100 per cent efficiency out of the new model machine tools which were unveiled at the National Machine Tool Builders' Show in Chicago last September—which machines now are being delivered to industry in constantly increasing numbers.

With those machines equipped with this improved tooling to match their speeds, feeds and accuracy possibilities, American tool engineers and machine tool builders have given the United States an "edge" on the rest of the world for the time being at least. To hold that edge, every encouragement now should be given to industry to re-equip to the limit in the 1948 manner.

That was the consensus of opinion of all who attended the tool show. That was the lesson which could be read between the lines of the papers delivered at the 16th annual convention of the American Society of Tool Engineers. That was what was demonstrated in the modern plants through which inspection trips were run during the show and convention. If America is kept at peak industrial efficiency, it automatically is in shape for quick conversion to production of various things needed to back up participation in world politics as now practiced.

The basic theme which ran through the majority of the 300 widely varied exhibits was "how to get more parts out of a given amount of metal with minimum wear-and-tear on men, machines and tools and at the same time at maximum efficiency of men, machines and tools."

Emphasis on Dies—In line with current needs for conserving metals, there was considerable emphasis on dies and machines for forming and casting metal to close limits without waste of metal. By the same token, there was equally strong emphasis on machines and tools for cutting the dies on which metal forming proces-

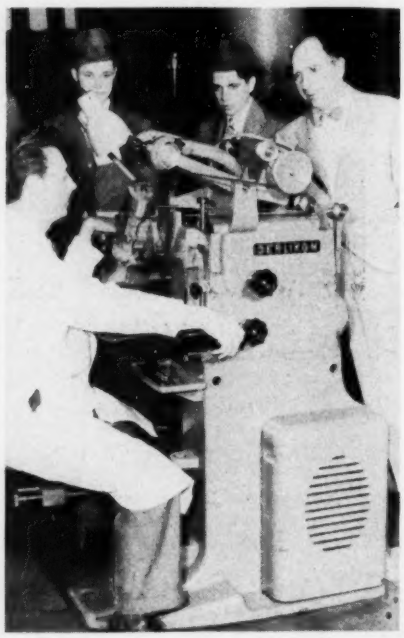
Show-goers inspecting Navy model of Pratt & Whitney reciprocating aircraft engine equipped with two superchargers

Show interest centers about new lighter model radial cut-off saw, in this case utilizing abrasive cutting disks

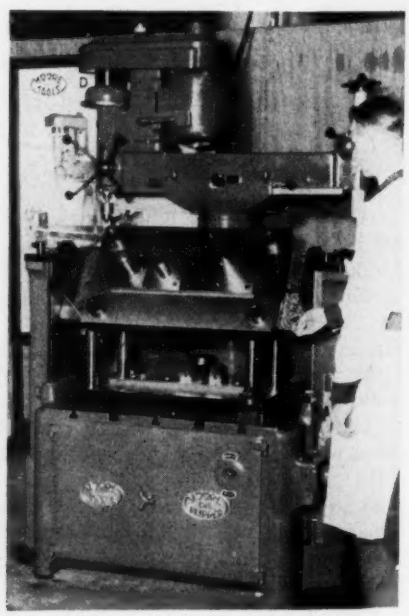
Sheet metal fabricating units, using hydra-new-matic drive, enables operator to punch, notch and nibble on same machine

ses depend. Obviously it would be impossible today to keep up with such demands with old-fashioned hand die sinking methods. Therefore, the skill of the die sinker has been designed and built into machines which spread this skill over a wide field by multiplication of the machines embodying that skill.

That same principle of multiplication of skill by mechanical, electrical, hydraulic and pneumatic means also was evident in a wide variety of machines ranging all the way from



Operator demonstrates diamond wheel grinder for watch and small parts



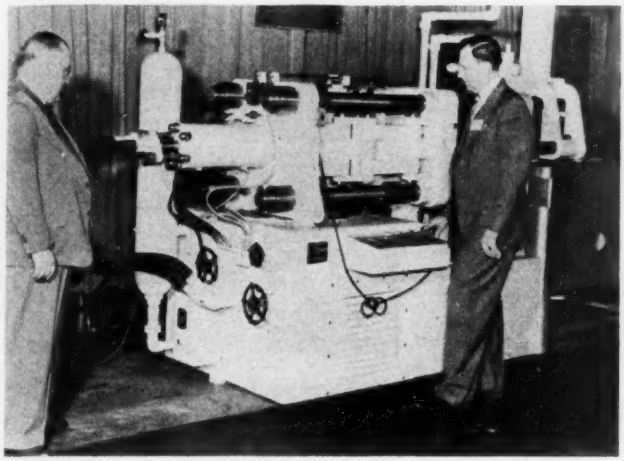
Saving in time is effected by this "flipper" by which operator tests and assembles dies in tool room

those turning out minute watch parts to those sawing big steel bars into gear blanks.

As was pointed out during one of the technical sessions by A. H. Morgensen, industrial consultant and director of the Lake Placid Work Simplification Conference, the big problem today is not further to boost feeds and speeds, but rather to get a more sensible ratio between the actual cutting time and work handling time, setup time and out-and-out "idle time" in machines.

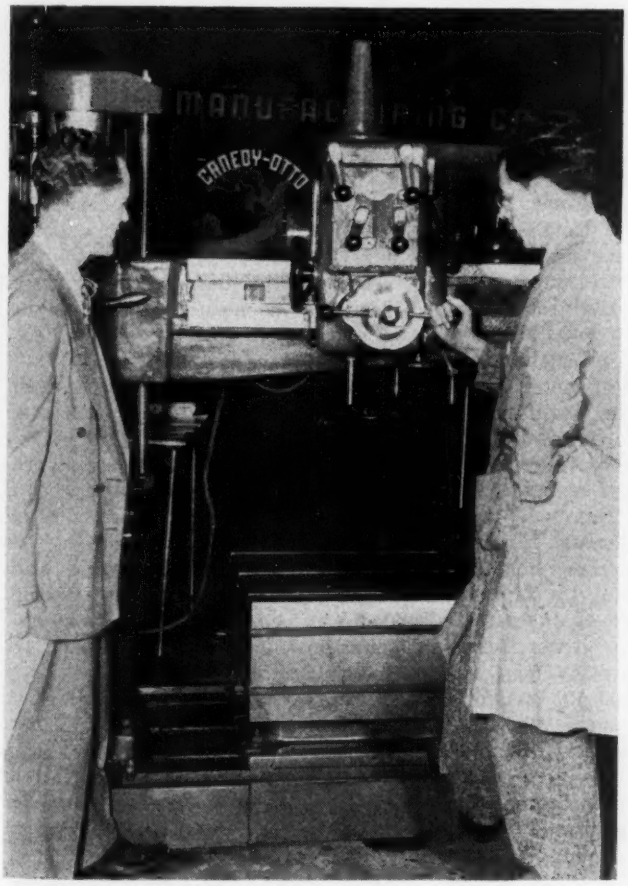
Cases Cited—He cited cases to prove that even with modern machines the breakdown is as follows: Handling 35 per cent; setup 13 per cent; idle time 29 per cent; and actual cutting time only 23 per cent. He showed how productive time could be increased to 46 per cent without changing speeds or feeds—simply by using a little "horse sense" and simple improvements in chucking, etc. He did stress, however, that workmen must be carefully "sold" on such improvements so that they will not fear loss of jobs.

There were many things in the



Die casting machine, above, eliminates necessity of opening die to maximum for ejection of castings

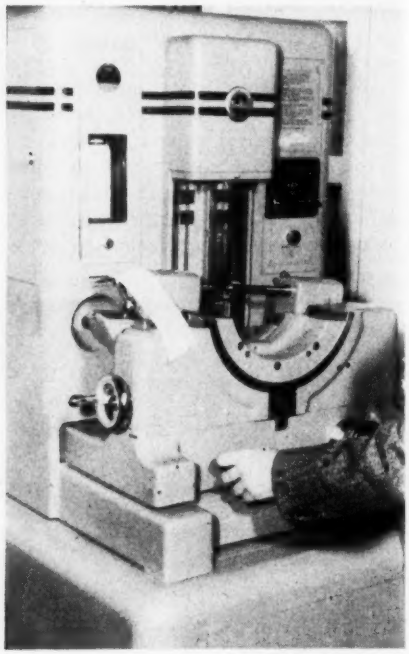
Plastics model of multi-purpose contouring machine at right provides "insight" for tool engineers



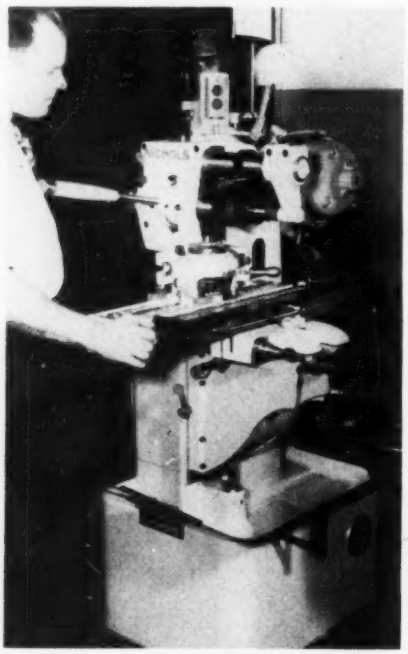
New type radial drill with 3-ft arm and 7-in. column makes radials available to small shops

Comparator, which determines lead of a gear by comparison to known lead, is shown in action

Large volume of fast, accurate grinding is possible with this machine designed for finishing carbide and high-speed tools



Gears up to 8.25 pitch diameter may be inspected with this apparatus



Semi-automatic milling machine has pneumatic table feed and rise-and-fall spindle

show which will further the ends just mentioned. Among them might be mentioned air operated clutches and brakes; air and hydraulic cylinders for locking and for transferring work in machines and for operating slides according to a predetermined cycle and pattern; quick removable tools; tools which can be sharpened and dressed to exact size and shape; fixtures for such sharpening and dressing; checking and inspection devices which give instantaneous readings to close limits; automatic gaging apparatus which selects work according to its accuracy as fast as high production machines turn it out; tools which require sharpening only at infrequent intervals; and drafting equipment which does away with wasted time in getting designs on paper.

Waste Intolerable—This list could go on to great lengths but the whole thing adds up to the fact that America no longer is such a land of plenty that material or manpower or machine capacity wastes can be tolerated. It points up the fact that on the shoulders of the tool engineers—more than any other one group in industry — rests the responsibility of getting maximum production by making every pound of material and every minute of time, count to the utmost. In view of what this show brought out, it now becomes apparent that our recently vaunted "war production records" were in many cases achieved only through the most prodigal use of materials, men and machines — a wasteful performance which America never again can afford either in peace or in war. James D. Mooney, president of Willys-Overland Motors and authority on world economic conditions, made that clear in his address at the annual banquet of ASTE.

Mr. Mooney said that the road to peace the next several years logically follows the course of our effectively encouraging the development of the production and military strength of the western powers and the political coherence of these western powers.

"In other words," he said, "the road to peace lies in the following direction: (A) Our maintaining our own production and military strength; (B) our assisting our traditional ally, England, and the British Empire to reconstruct her production and military strength; (C) our working with the British to re-establish France within the hegemony of western powers; (D) our working with the British and French to re-establish German production for the benefit of Western Europe and the British Isles."

The give-and-take and swapping of ideas are the most valuable features of any ASTE gathering. That sort of thing was exemplified in the panel discussion which marked the final session of the meeting. Under the leadership of Robert W. Ford of Ex-Cell-O Corp., ASTE national program chairman, the following board of experts exposed themselves to all manner of questions "fired" by the audience: N. E. Rothenthaler, Ford Motor Co.; Emil Gairing, Gairing Tool Co.; A. H. Mogensen, industrial consultant; Ted Miller, Fellows Gear Shaper Co.; A. H. d'Arcambal, Pratt & Whitney; William H. Oldacre, D. A. Stuart Oil Co.; James K. Fulks, Ex-Cell-O Corp.

Things which among European tool engineers would be carefully guarded "trade secrets" were freely revealed and freely discussed. That is the American way and a good way it certainly has proved to be if results

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Sixth Postwar Coal Walkout

Steel mill operations to be curtailed this week if mines continue idle. Loss in steel output, due to mine stoppages since V-J Day, totals millions of tons

STEELMAKING operations will be curtailed this week if the coal mine stoppage continues. The cutback in steel production will be the sixth necessitated by coal miners' walkouts in the past two and a half years. Previous coal disputes have caused the loss of millions of tons of critically needed steel products and have accentuated the postwar shortage.

The mine idleness started in a week which attained a postwar peak in steel production. Output last week was scheduled at 1,757,400 tons of ingots and castings, highest for the past three years.

Stocks Moderate—Coal stocks at most steel mills are only moderate, averaging 27 days' supplies at the beginning of February. These vary widely among the various mills.

Foundries depending on beehive coke will be affected almost immediately by the coal stoppage. Pittsburgh district foundries, for example, have only four to five days' supply of coke. Other foundries will suffer from a poorer quality of coke when stockpiled coal is used for coking. Practically all foundries will feel quickly any cutback in blast furnace operations, being virtually on a hand-to-mouth basis in pig iron supply.

Sixth Postwar Stoppage—Current walkout by the miners is the sixth major interruption to coal production caused by John L. Lewis since V-J Day. A study of previous closings not only indicates the pattern of steel mill curtailments likely to result from this stoppage, but also emphasizes the tremendous loss in production already caused.

First postwar stoppage in the coal mines occurred in October, 1945, with unionization of foremen as the issue. This stoppage was not industry-wide, affecting only about one third of the miners. However, steelworks operations dropped from 83 per cent of capacity to 65 per cent within two weeks. Eight weeks were required to bring operations up to where they were before the strike started.

Second walkout came at the beginning of April, 1946, just when the mills were getting back into production after an industry-wide steel strike. This was the usual "no contract, no work" stoppage and kept the mines virtually idle until the early part of June when they were reopened under government seizure.

From a late March operating rate of 89.5 per cent, steel production slid to 81.5 per cent in the first week of the strike to 75.5 in the second week and continued down until it was under the 50 per cent mark during the latter three weeks of May. After the mines reopened, several weeks were required to get steel mills back in production and an operating rate of 85 per cent was not reached until the week of June 22.

Third walkout started Nov. 20, 1946, when Lewis struck the mines under government operation. This continued until Dec. 7 when the union chief bowed to the federal court which had cited him for contempt. Steelworks operations slumped from 91.5 per cent before the strike to 65.5 per cent in the week ending Nov. 30 and to 60.5 per cent in the week of Dec. 7. Again several weeks were required to restore normal operations.

Fourth walkout was the 6-day memorial holiday following the Centralia mine disaster in March, 1947. This had no appreciable affect on steel mill operations.

Fifth stoppage occurred last July when the miners took a holiday at the time the government relinquished control of the mines to the private operators who granted the miners the sharpest wage increases given any major industry since the war, agreed to the 10 cents a ton royalty for a miners' welfare fund, and incorporated the clause that miners work when they were "willing and able." The first week of this holiday saw steelworks operations dropping from 96.5 to 73 per cent of capacity.

Pension Is Issue—Apparent cause for the present walkout is John L. Lewis' dissatisfaction over the administration of the welfare fund. He reportedly had demanded that every miner of age 60 and with 20 years of service in the mines be granted $100 a month-pension. Operators object the welfare fund will not support such pensions.

Currently the welfare fund has only two trustees—Lewis representing the miners, and Ezra Van Horn representing the operators. The neutral trustee resigned some months ago.

Van Horn has asked Lewis to join him in asking the federal courts to appoint a third trustee, which would enable resumption of negotiations on the pension issue.

Tool Industry's Aims Explained

THREE AIMS of the machine tool industry were outlined last week in a program termed "important" to the industry and "vital" to America and to the security of the world. A. C. Bryant, president, National Machine Tool Builders' Association, addressing the spring meeting of the American Machine Tool Distributors' Association in Los Angeles Mar. 15, said these goals are:

1. Stimulate modernization of American industry through installation of the more productive 1948 models of machine tools by: (a) Correcting government's shortsighted depreciation policy, (b) changing tax laws to permit use of more profits for rehabilitation, and (c) selling the "front office" on the value of investing in profit-making machines;

2. Improve methods of distribution of tools so that all industry may have the benefit of sales engineering service;

3. Spread . . . a fuller realization of the axiom that the way to "more goods to more people at less cost" is by the utilization of modern, high-production machine tools.

Industry's Condition Examined—In asserting the need for such a program, Mr. Bryant posed several questions on whether the industry can function effectively under present conditions. "Can this industry," he asked, "after stretching itself to a 1942 volume of $1-1/3 billion contract to a capacity of $600 million, and thrive on a continuance of its 1947 rate of $300 million? Can the industry keep its prices at only 45 per cent above 'frozen' levels; operate at one-half capacity, and survive?"

Taft-Hartley Political Activity Ban Held Void

Taft-Hartley Act ban on union political spending was declared unconstitutional and a trespass on free speech and free press by a federal district court in the District of Columbia last week. The ruling came in the government's case against Philip Murray, president of the Congress of Industrial Organizations and of the United Steelworkers of America, in which Murray was accused of illegal campaigning in a congressional election.

Truman Board Hits Price Rise

Against "public interest," say economic advisers. Justice Department finds no evidence of collusion. Commerce says steel increase more moderate than other prices

RECENT increases in semifinished steel prices are sharply censured by the President's Council of Economic Advisers as being contrary to the "public interest." Department of Justice, however, finds no evidence of collusion among the producers, and the Department of Commerce reports steel price increases have been more moderate than in other lines.

These, in essence, are the conclusions from the three-way investigation asked by the administration of the recent semifinished price adjustments.

The Council of Economic Advisers report admits that steel price increases have been less than those for manufactured articles in general and much less than for agricultural products, and also less than the advances in wages and in raw material costs.

Cite High Profits — "In spite of these evidences of moderation in price-making, the steel industry has been able to earn profits (after taxes) higher than at any time in its history, with a few exceptions for individual companies," the council points out.

"The steel price action forces upon our attention the fact that inflationary influences are still strong. If this inflationary trend is to be halted without broad use of public powers, all those who occupy strategic positions in the setting of prices, in the fixing of wages, and in the granting of credit must recognize the public interest in their private economic decisions in a way the steel industry has not shown in this instance. Up to this time, the evidence does not indicate that it was prudent to postpone action upon the principal features of the anti-inflationary program which you proposed in November."

Credit Publicity—The council says the public attention aroused by the call for the three-way investigation of the semifinished price rise "has served notice on industry that any general price increase will have to be defended strongly before the bar of public opinion. Had it not been for this publicity, the rise in steel prices would undoubtedly have acted as an encouragement to others to proceed with price advances."

No Collusion—The investigation by the Department of Justice disclosed no evidence of concerted action by the producers. Attorney General Tom Clark reports that the first increase was made by Carnegie-Illinois Steel Corp. Feb. 12 to become effective at 12:01 a.m. Feb. 13. Similar increases were made by other United States Steel Corp. subsidiaries at the same time. No public announcement of these increases was made.

Some other steel producers made similar increases within the next ten days. All told the FBI that they did not obtain knowledge of the Carnegie-Illinois increases from that company but learned of them from mutual customers or other independent sources.

Jones & Laughlin Steel Corp. made its decision Feb. 13 to increase its prices effective Feb. 16. Bethlehem Steel Co. made similar increases effective Feb. 18. Republic Steel Corp. increases were effective Feb. 16. Inland Steel Co. increases were effective Feb. 20. Alan Wood Steel Co. increased its prices Feb. 23.

Two producers of semifinished had not increased prices.

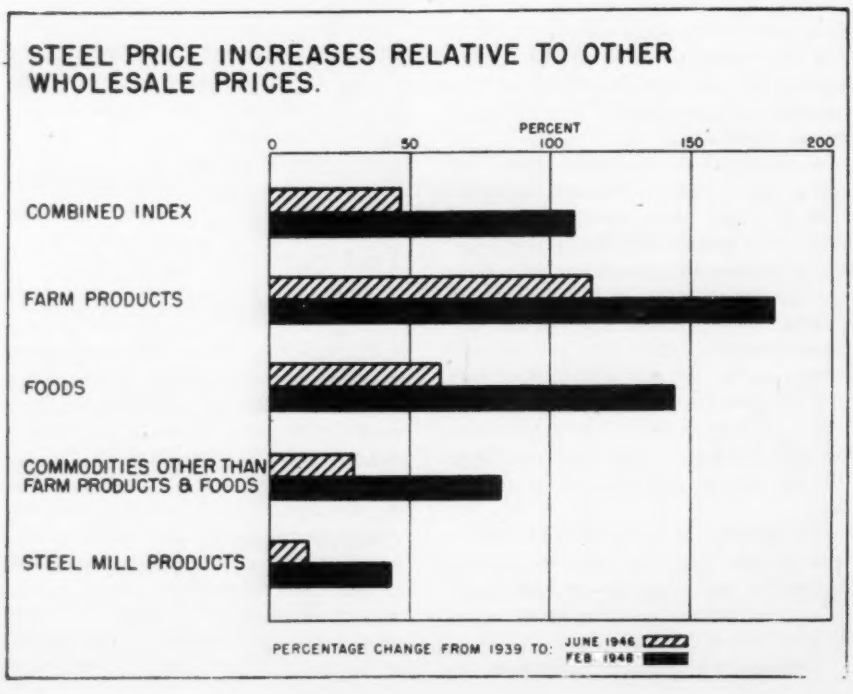
Steel Rises Moderate—The Department of Commerce report summarizing statistics of prices, costs and profits, substantiates the steel industry's argument that its price policies have been moderate.

Government indexes show that steel prices have increased much less than other wholesale prices (see accompanying chart). The report estimates the cost of the increase in semifinished steel at $30 million annually, and says the recent increase was less important than earlier increases.

While the average billed prices of the two largest producers have increased 46 and 48 per cent, respectively, from 1939 to January, 1948, average hourly earnings of steelworkers have advanced 80 per cent, scrap has gone up 150 per cent, and coking coal 136 per cent.

The commerce report says that while profits of the steel industry were high in 1947, most other components of the national income likewise were much higher.

Expenditures for plant and equipment for the steel industry rose to about $500 million, highest in history.



C. R. Burt To Head New Potter & Johnston Co.

Clayton R. Burt has resigned as chairman of Niles-Bement-Pond Co., West Hartford, Conn., to become president of Potter & Johnston Co., new subsidiary formed by Niles-Bement-Pond to take over the business of the former Potter & Johnston Machine Co., Pawtucket, R. I., which Niles-Bement-Pond has purchased.

No changes in Pawtucket personnel or operations are contemplated, but it is probable Potter & Johnston sales will be combined later with the national sales staff of Pratt & Whitney Division of Niles-Bement-Pond Co.

Acquisition of Potter & Johnston production machine tools rounds out the Pratt & Whitney line of precision machines without competition conflicts.

Mr. Burt has been associated with Niles-Bement-Pond 24 years.

Growing Use Of Magnesium Is Reported

IMPORTANT STRIDES in magnesium research and development work, with broadening application of the metal, were reported at the fourth annual meeting of the Magnesium Association in New York Mar. 18-19.

Information on postwar research work in magnesium by the Army, released for the first time, was of special interest. Lt. Gen. R. A. Wheeler, chief, Army Engineer Corps, revealed a new series of alloys whose compressive and tensile yield strengths approximate 74,000 pounds per square inch, have a specific gravity of about 1.5, can be cold-worked, rolled in any direction and at lower temperatures, and can be extruded.

Would Replace Steel — The Army hopes to develop air borne construction equipment in which magnesium will replace steel for certain large-weight components.

R. D. Taylor, association president, declared that magnesium has gained definite acceptance in the aircraft, trucking, materials handling equipment and consumer product fields.

Dr. William H. Dow, president, the Dow Chemical Co., Midland, Mich., in a paper read by T. W. Atkins, executive secretary of the association, pointed to the downward trend in price of finished magnesium products and the availability of the metal.

Permanent Mold Castings — Discussing magnesium permanent mold castings in competition, J. Colin Smith, American Magnesium Corp., Cleveland, said that although these castings are not competitive with aluminum or iron, "there most certainly are many types of parts where such a casting can enable a finished magnesium part to be competitive."

Bright metallic finishing of magnesium is now available for commercial production, according to W. S. Loose, Dow Chemical Co. J. W. Millard, research director, mechanical section, Research & Development Branch, Military Planning Division, Quartermaster Corps, U. S. Army, stated the corps is vitally interested in magnesium. Albert Palmer, vice president, Crompton & Knowles Loom Works, described the cost savings and high machine speeds being obtained in the textile industry through use of light weight metal. J. D. Barrington, Dominion Magnesium Ltd., Canada, described the industry in Canada.

Present, Past and Pending

■ PACKARD CHAIRMAN, TWO OTHER DIRECTORS RETIRE
DETROIT—Alvan Macauley, chairman and a director of Packard Motor Car Co., and Henry E. Bodman and Robert B. Parker, directors, retired last week. Three new directors are to be elected Apr. 19.

■ REACTIVATED PLANT TO MAKE ALUMINUM FOIL
PERMANENTE, CALIF.—Permanente Metals Corp. will reactivate its plant here as a light metals operation by establishing an aluminum foil mill. It will be equipped with machinery purchased in Germany under reparations arrangements.

■ TRIAL DATE IN STAINLESS STEEL CASE ASKED
WASHINGTON—Government attorneys have asked the U. S. District Court at Trenton, N. J., to set a trial date in late May or early June in the government's civil case charging 18 stainless steel producers with conspiracy to restrain trade, fix prices. In a companion criminal case defendants pleaded nolo contendere, paid $240,000 in fines.

■ SCRAP IN GERMANY OFFERED BY U. S. ARMY
WASHINGTON—U. S. Army is requesting bids on 75,000 tons of ferrous scrap comprised of demilitarized combat vehicles and 5000 tons of secondary aluminum ingots, all located in Germany. Bids will be opened at Heidelberg, Germany, May 10, and material sold must be returned to the U. S.

■ NEW HELICOPTER HAS ALL-METAL ROTOR BLADES
BRIDGEPORT, CONN.—A new experimental helicopter with all-metal rotor blades and other new design features is being flight tested for the Navy at the Sikorsky Division, United Aircraft Corp. plant here.

■ ADDITIONAL OIL STORAGE TANKS BEING BUILT
PITTSBURGH—Gulf Oil Corp. is building tanks to add 159 million gallons of storage capacity to its distribution points in the East.

■ RECEIVES CONTRACT FOR $5 MILLION TANKER
NEWPORT NEWS, VA.—Contract for an oil tanker of special design for N. G. Livanos, Greek shipowner, has been received by Newport News Shipbuilding & Dry Dock Co. Cost will exceed $5 million.

Decline Steel Allocations Aid

FARM equipment manufacturers last week told Secretary of Commerce Harriman they preferred to take their chances for supplies of steel with their regular suppliers rather than participate in the government sponsored voluntary allocations plan whereby steel and pig iron would be channeled to their plants under government directive.

At a meeting in Washington the industry advisory committee adopted a resolution to the effect the voluntary allocation is not practical for their industry so long as no other industry is given preferential treatment in the matter of supplies to the detriment of the farm equipment interests, and so long as deliveries permit the industry to produce at 1947 schedules or at 1948 schedules, whichever are higher.

Asks Study Continue—This action would seem to remove for the present, at least, the likelihood of any allocation of steel to the farm equipment makers. However, that future allocation is possible is seen in the fact the equipment committee asked it be continued in existence. It also asked that the Commerce Department continue its study of steel supplies going to the industry and also that the committee be kept informed of any significant change in conditions.

Several other industry meetings with Department of Commerce officials to discuss the voluntary allocations program have been scheduled. On Mar. 22 representatives of the cast iron pressure pipe and fittings industry will discuss proposals in Washington. On Mar. 23 a similar discussion will be held by representatives of the cast iron soil pipe and fittings industry, and on Mar. 30 a meeting of representatives of the plywood manufacturing industry is scheduled.

Warehouse Meeting — It was learned last week that representatives of the steel warehouse industry will meet with Department of Com-

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Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Loyalty investigations may become of greater importance to employers. Federal system of checking employees may suggest methods for industrial management

IN VIEW of the fact that many employers now are concerned, and may become increasingly concerned in the future, over the problem of what to do about employees suspected of disloyalty to the United States, a better understanding of how the government itself is handling this matter may prove helpful.

In brief, every department and agency has a loyalty board, topped by the President's Loyalty Review Board. The latter has laid down the policies and within a week or two will start to hear appeals from government employees accused of disloyalty. Dismissal from service will be approved only when the employee is found guilty of advocating the overthrow of the existing United States government, or when he gives his primary loyalty to a foreign government. He can express any political opinion, advocate any changes in the government as long as it is to be done by constitutional procedure, and be just as "radical" as he likes—but all will be forgiven as long as he is not guilty of either cardinal offense.

There is one weak spot in the set-up—and it is this weak spot which has brought charges that the loyalty program threatens to destroy the constitutional rights of the individual. The constitution, in federal criminal cases, guarantees the accused the right to be confronted by his accusers—and that is not possible in these loyalty cases. However, members of the Loyalty Review Board point out, these loyalty cases are not criminal cases; board spokesmen cite, for example, the fact that all actions in these cases are kept confidential from start to finish. Further, they point out, any federal employee accused of disloyalty can resign, upon which the proceeding will be closed.

Sources Guarded—The reason for the weak spot is the unwillingness of the Federal Bureau of Investigation to disclose its sources of information. All loyalty investigations must be made by the FBI, the only official organization for performing this work.

This same situation applies to the attorney general's list of organizations which "in his opinion" are subversive and are engaged in disloyal activities. The names of the organizations on this list, of course, were supplied by the FBI on the basis of information from its secret agents.

Few Are Disloyal—It is rather refreshing to note that after all the hue and cry about disloyalty among government employees, charges have been leveled against only some 750 of approximately 1,500,000 employees investigated. And it is expected that when these cases are gone into thoroughly the charges will be found to stick in only a small proportion of the cases.

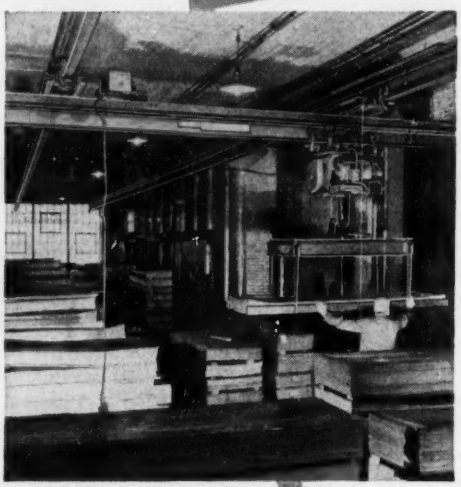
Loyalty Review Board spokesmen point out that the only thing that can happen to an employee found guilty of disloyalty is to be fired.

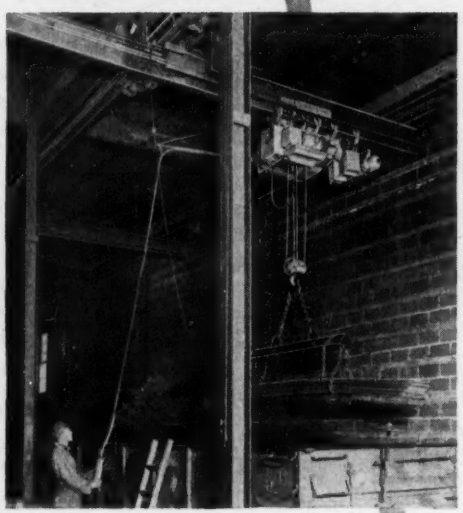
Training Labor Leaders

Far less attention than it deserves has been given by employers to a bill, S. 1390, now in the Senate Committee on Labor & Public Welfare. It would create in the Labor Department a new Division of Labor Education which would have something like $10 million yearly to encourage labor education in the various states. Each state would have its own Office of Labor Education and would use a kitty of federal and state funds to promote

LABOR-MANAGEMENT PANEL: Shown leaving the White House after meeting with President Truman for the first organization meeting of the new labor-management panel provided in the Taft-Hartley Act are these members of the panel, drawn from business and labor. Left to right, front row: James Black, president, Pacific Gas & Electric Co.; William Green, president, American Federation of Labor; Cyrus Ching, mediation chief; Philip Murray, CIO president; Allan S. Haywood, CIO vice president; back row: Lewis Lapham, president, American-Hawaiian Steamship Co.; Charles E. Wilson, president, General Electric Co.; Howard T. Colvin, associate director, Federal Conciliation Board; John J. Murphy, AFL director of organization; Harvey W. Brown, International Machinists Union president; George M. Humphrey, president, M. A. Hanna Co.; and John Stephens, vice president, United States Steel Corp. NEA photo

5-Ton Low Headroom MONORAIL CRANES





AMERICAN MONORAIL 5-Ton Cranes furnish efficient operation where headroom is a critical problem. Twin-bridges with carrier mounted between bridges bring load clearance to uppermost limit for extreme low headroom operation. American MonoRail Low Headroom Cranes operate by cab or from floor by finger-tip control. Interlocking devices permit carrier to travel beyond craneways. Loads are moved over maximum area, every square foot of operating and storage space is served. Cranes can be installed under present operating conditions without excessive structural changes.

An American MonoRail Engineer will be glad to discuss the possibilities of crane operation in low headroom areas regardless of the type of handling.

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labor education in state and other educational institutions.

Behind the bill is the National Committee for the Extension of Labor Education—an outfit with 66 members from the various labor unions and from universities and colleges. Its chairman is Hilda W. Smith who long has enjoyed prestige with labor in all camps. Its vice chairman is Frank Fernbach, of the research staff of the United Steelworkers of America-CIO. The National Committee is located at 2117 Pennsylvania Ave. N. W., Washington, and anybody who writes a request can get copies of the committee's literature which explains its proposition in detail.

Unionists Go to College—But the interesting story so far has not been told in print, and it is of special interest to the steel industry because the movement is an outgrowth of the plan which Vincent Sweeney of the United Steelworkers union, with the approval of Philip Murray, put into effect three years ago. Mr. Sweeney felt that to function properly for their unions and for the country in general, labor union officers needed specialized education. The result was that 400 USA-CIO union officials spent a week at Penn State College. They worked day and night and covered a lot of ground, but the consensus at the end of the week was that they had only gotten a taste of the real meal and that something much less superficial was needed.

Furthermore, union leaders outside of Pennsylvania complained that they needed education as well as the boys in Pennsylvania. Mr. Sweeney thereupon took hold of the matter on a national basis, with the result that hundreds of United Steelworkers men last summer received 1 to 2-week courses of instruction at universities in New Hampshire, Michigan, Wisconsin, Indiana, Illinois, Ohio, California, and Kansas. In addition, arrangements were made to bring the colleges to the union members by having college instructors go to the different cities and teach classes of union members.

Other unions have adopted the same procedure. The AFL has arrangements with many colleges, notably the universities of Kentucky and Colorado. Altogether some 70 educational institutions are conducting labor education courses and they now say they need government financial assistance to do the job.

The courses in the main do not involve controversial subjects. In general they are confined to teaching arbitration techniques, grievance procedure and matters that have to do with collective bargaining. An understanding of parliamentary procedure is a "must." Some of the courses include teaching in union public relations, and the place of the union in the community. It is rather interesting to note that when the one-week course was repeated at Penn State last summer a number of representatives of management were on hand to receive the same instruction as was given to union men.

No Bias—On one thing the committee insists: It will not approve of bias or propaganda courses in this program. The nature of the courses to a large extent will have to be left to the judgment of the educators. The committee insists, however, that it is in no sense sponsoring any program to create bargaining arguments on such controversial subjects as "ability to pay," "distribution of the proceeds of industry," "relation of wages to the cost-of-living," "relation of wages to man-hour productivity," etc. These are subjects on which no biased teaching is wanted.

The Ball subcommittee of the Senate Labor & Public Welfare Committee has completed its hearings on S. 1390 and is expected to file a favorable report on the basis that it would pay the country's taxpayers to spend $10 million a year for unbiased labor education if only one major strike were avoided as a result.

ERP Data in Record

For anyone with the time to read it, *The Congressional Record* in its March issues offers a wealth of information on the European Recovery Program and the pros and cons of the debate in Congress.

The Mar. 3 issue, on Senator Brewster's motion, contains detailed tables showing the 11,231,000 deadweight tons of ships the ERP nations are building or plan to build from 1947 to 1951. That issue contains the reasoning which led the Senate on Mar. 10 to kill a provision under which 300 surplus American ships could be chartered to foreign governments. It sets forth the two prevailing arguments: That the United States has enough ships to take care of all demands and needs business to keep its seamen employed, and that in view of the labor shortage in Europe men should be employed there in more essential tasks than shipbuilding.

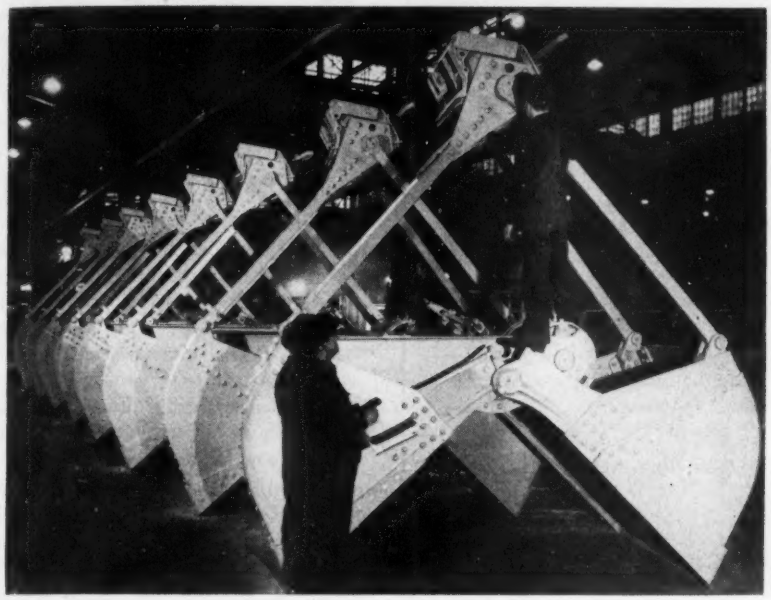
U. S. to Belgium to Russia—Several issues contain speeches dealing with the ramifications of European trade relations. The Mar. 5 issue, for example, contains a speech by Senator Malone to the general effect that whereas Belgium is on the ERP agenda to receive 259,000 tons of American steel and an indefinite quantity of American fertilizer, Belgium has promised to export 50,000 tons of steel and large quantities of fertilizer to Russia. The Malone speech, allowing for interruptions, took five hours to deliver and is replete with sidelights—as a positive assertion to the senator by Sir Stafford Cripps that the steel industry is the next in line for nationalization in Britain. The speech sets forth details of Britain's present trade agreement with the Russians, the reasons underlying Britain's deficient coal production, etc. Perhaps the most interesting portion of the Malone speech is in reference to British views on financial help to be received under ERP. Britain—and Malone quotes Cripps—does not need money for her own home rehabilitation and development. Rather, said Senator Malone, she wants it to build up her colonies and industrialize them. And, said the senator, she does not want American private capital; rather, she wants Marshall Plan capital under terms which will promote government control as contrasted with private control of industry.

Cites Russian Spy Activities—Senator Wiley's speech in the Mar. 8 issue represents a pretty convincing going-over of Russian spy activities in the United States. He revealed a report of the late Ambassador Oumansky identifying the Panama Canal and the Sault Ste. Marie locks as America's two vulnerable points, and recommending preparation for attacking these installations at any given moment.

The Mar. 1 issue, on Senator Wherry's motion, contains the complete breakdown of 1947 United States exports to Russia—which, incidentally, came to the rather unimpressive total of $149,129,000. However, the record elsewhere, particularly in the Malone speech, shows that plenty of goods are going from ERP countries to destinations back of the Iron Curtain—particularly from Britain and Belgium. The Belgians are committed to ship to Russia this year 10 million Belgian francs' worth of miscellaneous machinery, and, in addition, an indefinite number of railway cars, and many other items. Senator Revercomb covered British steel shipments to Russia.

The dismantling of German plants for shipment to Russia drew sharp criticism from a number of the senators.

Steel for Germany—Lack of certainty as to how much steel is to be shipped to Europe under the Marshall Plan was reflected in a speech by Senator Langer.



CLAMSHELLS FOR FRANCE: Receiving final inspection at the Pittsburgh fabricating plant of Blaw-Knox Co. are these eight clamshell buckets being readied for shipment to France to speed rehabilitation work in that country. They are the last of 189 ordered by France from Blaw-Knox

Steel Tonnage Sought By India

THE government of India is seeking to import 300,000 tons of steel, according to Dr. J. C. S. Ghosh, director general of industries and supplies for the government. India's steel capacity is about 1,250,000 tons, but 1948 production is not expected to exceed 750,000 tons. Today, demand for steel throughout the country comes to around 3 million tons.

Steel Is Allotted—The government has allotted 25 per cent of production to various provincial governments, and the remaining 75 per cent is controlled for meeting special government needs, including agricultural implements and agriculture in general. As a result, other industries are getting only about 25 to 30 per cent of their requirements.

Dr. Ghosh states that in the future, so far as allocation of raw materials to various industries and manufacturers is concerned, the government will be guided by recommendations of representative associations.

Prices Are Raised—The government has decided to raise the price of steel purchased from registered stock lists by Rs 80/ per ton ($26.40), an increase of nearly 30 per cent.

Consequent on acceptance by the Tata Iron & Steel Co., Ltd., and the Steel Corp. of Bangal Ltd., of a reduction of Rs 12/8/ per ton ($4.13) in the price of steel on account of the removal of the excess profits tax, it was possible for the government to effect a substantial reduction in the selling price of steel to consumers from Apr. 1, 1946. Since then labor and materials costs have risen.

Taking into consideration these factors, it was decided that the cut of Rs 12/8/ ($4.13) be restored to the companies.

Freight Charges Up—Due to recent increases in freight charges there will be an addition of Rs 11 ($3.63) payable to the main producers. In other words, the main producers will get Rs 23/8/ per ton ($7.76) in all.

The government expects to import from the United States and the United Kingdom substantial quantities of steel in 1948 but the price of this steel will be about Rs 200 ($66) per ton higher than the Indian price.

To equalize the high prices of imported steel with those of indigenous steel and to meet the additional payment of Rs 23/8/ ($7.76) to the main producers, the prices at which the consumers will purchase from the registered producers have been increased by Rs 75 per ton ($24.75).

The prices at which the controlled and registered stockholders will sell have been increased by Rs 80 per ton ($26.40), the extra Rs 5 ($1.65) to cover the Bihar sales tax.

Nationalized British Steel Still Planned

BRITAIN'S government still intends to nationalize the country's steel industry despite the rapidly rising rate of production which has been noted in the last 12 months. This was indicated by Sir Stafford Cripps, chancellor of the exchequer, in a report on the position of British industry.

The country's minimum steel target for the year is 14 million tons, he said, disclosing that production in February was above the 15-million ton mark on an annual basis.

Semifinished Steel Scarce—Greater imports of semifinished steel are needed if rerolling works are to be kept operating.

Total iron and steel imports amounted to 34,280 tons in January, against 27,880 in the like month of 1947, but in the latest month only 7801 tons of semifinished were brought into the country as compared with 8348 tons a year earlier.

Better Distribution Sought—Efforts are being made to make the steel distribution scheme operate more effectively than it has since the end of the war, and all authorizations for steel will come to a close at the end of this month.

Car Exports Rise—Recent figures on Britain's automobile exports show greater volume than ever before. January exports of 16,000 cars represented 67 per cent of the British industry's output.

Swedish Iron Ore Being Shipped to Germany

DUSSELDORF, GERMANY

Authorities of the American and British Zones of Germany have concluded an agreement with Sweden for importation of 1,400,000 tons of iron ore during 1948. The first cargo of 7000 tons has been shipped from Narvik, Norway.

The deal was arranged by representatives of the Joint Export-Import Agency and the German steel administration.

It has been pointed out for some time that German steel production could not be increased even to the low level of 5 million tons without use of high grade Swedish ores. The goal this year is 6 million tons.

Various Swedish groups have been trying to arrange for resumption of

BRITAIN'S FEBRUARY STEEL OUTPUT SETS RECORD

BRITISH steel production rate was the highest in history in February, on an annual basis exceeding 15 million tons, British Iron & Steel Federation announces. January's rate had been the previous all-time high, calculated at 14,589,000 tons for the year. The latest month's figure of 15,049,000 tons annually compares with the February, 1947, annual rate of 10,726,000 tons, when production was suffering from the fuel crisis. Pig iron production in February was at the annual rate of 9,169,000 tons, compared with 8,726,000 tons in January and 6,560,000 tons in the like 1947 month. Details of production rates in tons are shown below.

STEEL INGOTS AND CASTINGS

	1948		1947	
	Weekly Average	Annual Rate	Weekly Average	Annual Rate
January	280,600	14,589,000	239,800	12,470,000
February	289,400	15,049,000	206,300	10,726,000

PIG IRON

	1948		1947	
	Weekly Average	Annual Rate	Weekly Average	Annual Rate
January	167,800	8,726,000	150,100	7,806,000
February	176,300	9,169,000	126,200	6,560,000

ore shipments to Germany and, at the same time, obtain deliveries of German coal and finished products. Belgium and Luxemburg are using Swedish iron ore for the first time, a total of about 2,600,000 tons this year. Bethlehem Steel Corp. is reported to have contracted for 1,400,000 tons, Poland for 740,000 tons and Czechoslovakia for 800,000 tons.

Quotas Set for Steel Exports To 48 Nations

TO AID exporters in planning shipments of many iron and steel products subject to export control, Office of International Trade, Department of Commerce, has set up first quarter approximate quotas for 48 principal importing countries. These quotas, by product and by country, are shown in the table below.

Distribution of quotas by countries has been based primarily upon the stated needs of these countries, OIT explains, but adds that an undistributed reserve has been withheld in each product classification to permit some essential shipments to countries other than the main importers.

Omits Some Commodities—Certain commodities are not covered in the OIT's country-product planning, either because of the small export quotas

OFFICE OF INTERNATIONAL TRADE'S STEEL EXPORT QUOTAS FOR 48 COUNTR

(Short Tons)

	Concrete Reinforcement Bars	H-R Carbon Steel Bars (1 in. and under)	Wire Rods (exc. specialty steel)	Plates	Galvanized Sheets	Black Sheets	H-R Carbon Strip	Structural Shapes (not fab.)	Pipe Fittings	Welded Black Steel Pipe	Welded Galva Steel Pip
Argentina	201–300	751–1,200	501–750	1,201–2,000	751–1,200	2,001–5,000	301–500	301–500	71–125	301–500	301–500
Australia	.....	.....	.....	.....	.....	1,201–2,000	.....	.....	.....	.....	.....
Austria	.....	.....	.....	.....	201–300	301–500	.....	.....	Under 50	71–125	.....
Belgian Congo	201–300	Under 50	.....	.....	126–200	2,001–5,000	.....	71–125	Under 50	Under 50	.....
Bolivia	126–200	71–125	.....	.....	50–70	71–125	Under 50	50–70	Under 50	.....	50–70
Brazil	301–500	1,201–2,000	301–500	1,201–2,000	1,201–2,000	2,001–5,000	751–1,200	751–1,200	126–200	501–750	501–750
Brit. West Ind. (West. Hem. colonies)	126–200	126–200	.....	71–125	50–70	71–125	Under 50	126–200	Under 50	Under 50	50–70
Ceylon	71–125	126–200	.....	71–125	71–125	126–200	.....	126–200	Under 50	.....	50–70
Chile	301–500	751–1,200	126–200	501–750	.....	751–1,200	126–200	126–200	71–125	201–300	201–300
China	751–1,200	501–750	201–300	2,001–5,000	126–200	2,001–5,000	126–200	751–1,200	50–70	201–300	126–200
Colombia	751–1,200	301–500	71–125	301–500	201–300	50–70	.....	201–300	50–70	126–200	126–200
Costa Rica	126–200	71–125	Under 50	Under 50	71–125	71–125	50–70	71–125	Under 50	.....	71–125
Cuba	751–1,200	126–200	50–70	751–1,200	301–500	501–750	50–70	751–1,200	71–125	301–500	301–500
Denmark	126–200	.....	301–500	2,001–5,000	.....	1,201–2,000	301–500	.....	71–125	301–500	301–500
Dom. Repub.	126–200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ecuador	71–125	.....	50–70	Under 50	.....	71–125	.....	.....	Under 50	50–70	50–70
Egypt	301–500	301–500	50–70	71–125	.....	71–125	50–70	71–125	Under 50	71–125	50–70
Eire	.....	.....	71–125	.....	.....	.....	.....	50–70	.....	.....	.....
France	1,201–2,000	2,001–5,000	1,201–2,000	10,001 & over	751–1,200	5,001–10,000	301–500	2,001–5,000	.....	.....	.....
Greece	501–750	2,001–5,000	2,001–5,000	751–1,200	2,001–5,000	5,001–10,000	751–1,200	1,201–2,000	50–70	126–200	126–200
Guatemala	126–200	71–125	.....	71–125	71–125	71–125	.....	50–70	Under 50	50–70	71–125
Haiti	71–125	Under 50	.....	.....	.....	.....	.....	.....	Under 50	50–70	.....
Honduras	126–200	Under 50	.....	.....	50–70	.....	.....	.....	Under 50	Under 50	50–70
Iceland	.....	.....	.....	.....	.....	501–750	.....	50–70	.....	.....	.....
India	501–750	301–500	.....	751–1,200	126–200	1,201–2,000	71–125	751–1,200	126–200	751–1,200	126–200
Italy	.....	751–1,200	.....	1,201–2,000	.....	1,201–2,000	.....	2,001–5,000	.....	.....	.....
Malaya, Sing.	201–300	201–300	.....	301–500	50–70	1,201–2,000	50–70	50–70	Under 50	.....	71–125
Mexico	2,001–5,000	301–500	301–500	751–1,200	201–300	2,001–5,000	301–500	501–750	301–500	1,201–2,000	751–1,20
Newfoundland	71–125	Under 50	.....	71–125	.....	71–125	.....	71–125	.....	.....	.....
New Zealand	71–125	.....	.....	71–125	201–300	.....	.....	.....	.....	.....	.....
Netherlands	2,001–5,000	2,001–5,000	.....	10,001 & over	.....	2,001–5,000	201–300	2,001–5,000	Under 50	126–200	.....
Netherlands E. Indies	301–500	751–1,200	.....	1,201–2,000	501–750	751–1,200	.....	.....	.....	.....	.....
Nicaragua	126–200	.....	.....	.....	50–70	.....	.....	.....	Under 50	.....	50–70
Norway	1,201–2,000	1,201–2,000	301–500	10,001 & over	126–200	2,001–5,000	301–500	751–1,200	50–70	201–300	126–200
Palestine	201–300	.....	.....	71–125	126–200	301–500	.....	.....	201–300	751–1,200	301–500
Panama	301–500	71–125	.....	71–125	126–200	50–70	.....	50–70	Under 50	.....	71–125
Paraguay	126–200	50–70	.....	.....	.....	.....	.....	.....	.....	.....	.....
Peru	751–1,200	301–500	.....	201–300	71–125	201–300	.....	126–200	Under 50	126–200	71–125
Philippines	2,001–5,000	751–1,200	71–125	751–1,200	751–1,200	751–1,200	.....	751–1,200	301–500	501–750	1,201–2,00
Portugal	301–500	751–1,200	71–125	751–1,200	126–200	501–750	126–200	301–500	Under 50	.....	71–125
Salvador	71–125	201–300	.....	Under 50	.....	71–125	.....	50–70	Under 50	71–125	50–70
Sweden	751–1,200	1,201–2,000	501–750	2,001–5,000	301–500	1,201–2,000	.....	301–500	71–125	501–750	126–200
Switzerland	.....	.....	71–125	751–1,200	201–300	751–1,200	301–500	.....	Under 50	71–125	.....
Turkey	301–500	201–300	.....	501–750	126–200	301–500	.....	201–300	Under 50	126–200	71–125
Un. of S. Af.	301–500	501–750	71–125	751–1,200	201–300	1,201–2,000	126–200	301–500	Under 50	71–125	71–125
United King.	.....	751–1,200	201–300	751–1,200	.....	1,201–2,000	301–500	1,201–2,000	.....	.....	.....
Uruguay	301–500	201–300	.....	126–200	126–200	71–125	126–200	201–300	Under 50	50–70	50–70
Venezuela	751–1,200	751–1,200	71–125	126–200	301–500	501–750	Under 50	751–1,200	71–125	201–300	301–500
Totals	18,986–35,950	19,640–37,166	6,584–12,434	50,197–68,150+	9,733–17,300	40,594–82,065	4,714–7,752	17,108–32,840	1,704–3,808	7,101–11,402	5,933–9,580

or because of the specialized demand for the products. Commodities which are licensed for export on a hardship basis likewise are not included because country quotas have not been established.

OIT has established first quarter country quotas for cold-finished carbon steel bars (1 in. and under), for cold-rolled carbon strip, and for nails, but due to the relative unimportance, tonnagewise, of these products, they have been omitted from the accompanying tabulation. According to OIT, it will grant licenses for from 3273 to 5640 short tons of these bars, for 3184 to 5093 short tons of cold-rolled strip and for 3175 to 5291 short tons of nails for shipment to the listed countries.

France To Get Most Tonnage—Ten principal beneficiaries of OIT's steel products quotas, based on maximum tonnage which may be licensed for shipment, are the following: France, the Netherlands, Greece, Norway, Brazil, Mexico, the Philippines, China, Argentina, and Sweden, with possible first quarter allotments ranging from 13,025 short tons for Sweden to over 35,701 short tons for France.

Previous to issuing these country-product export quotas, OIT had issued a revision for Schedule B No. 602000, which deleted all sizes of cold-finished stainless steel bars from the positive list of commodities requiring a validated license for export.

Exporters' Advice Sought—Advisory groups of merchant and manufacturing exporters are currently being selected by OIT for the purpose of securing closer relationships between parties interested in the new export licensing policies and the Commerce Department.

Panels of exporters will be selected according to industries affected by the new regulations and small task committees will be drawn from these regular panels to study special licensing problems. The new advisory groups will not replace the Export Advisory Committee, OIT says, but will provide a commodity-by-commodity representation and will allow frequent consultation as the need arises.

1947 Steel Exports Reported—American exports of iron and steel semifinished and finished products in 1947 totaled 6,591,282 net tons, Commerce Department has announced, with December exports virtually unchanged from the previous month.

Of the December total of 558,735 net tons, which compared with 558,234 net tons shipped abroad in November, tin plate and taggers' tin accounted for the largest volume, with 67,779 tons. Rails were second in tonnage with 57,630. Third largest tonnage was of structural shapes, at 51,949, with black steel sheets fourth, accounting for 50,535 net tons.

For the entire 1947 year, structural shapes took the largest tonnage, with 754,182 net tons having been shipped. Tin plate, placing second in tonnage, accounted for 609,509 net tons. Black steel sheets, with 568,867 tons exported, were third, followed by unfabricated plates, excluding boiler plate, with 530,265 tons shipped abroad.

Details of shipments in December and for the entire year by product are shown in the table below.

COUNTRIES

Welded Galvanized Steel Pipe	Iron, Steel Wire (uncoated)	Totals
301–500	751–1,200	7,432–13,775
.....	.....	1,201–2,000
.....	.....	574–974
.....	.....	2,402–5,772
50–70	50–70	470–828
501–750	1,201–2,000	10,037–18,100
50–70	.....	623–1,137
50–70	50–70	692–1,164
201–300	751–1,200	3,906–6,175
126–200	501–750	7,336–15,170
126–200	201–300	2,379–3,765
71–125	Under 50	535–1,091
301–500	126–200	4,080–6,515
301–500	.....	4,603–9,325
.....	.....	126–200
50–70	50–70	344–628
50–70	50–70	1,087–1,829
.....	.....	121–195
.....	.....	22,458–35,701+
126–200	.....	14,510–30,620
71–125	Under 50	583–1,063
.....	.....	123–293
50–70	.....	229–487
.....	.....	551–820
126–200	301–500	5,006–8,075
.....	.....	5,154–10,200
71–125	50–70	2,176–3,554
751–1,200	301–500	8,912–17,950
.....	50–70	335–619
.....	301–500	644–1,050
.....	301–500	18,634–31,050+
.....	.....	3,505–5,650
50–70	.....	227–389
126–200	2,001–5,000	18,261–26,971+
301–500	.....	1,952–3,125
71–125	.....	741–1,264
.....	50–70	226–340
71–125	126–200	1,975–3,199
1,201–2,000	1,201–2,000	9,031–16,375
71–125	301–500	3,301–5,349
50–70	50–70	566–983
126–200	.....	6,955–13,025
.....	.....	2,147–3,499
71–125	301–500	2,130–3,424
71–125	501–750	4,097–6,624
.....	501–750	4,907–7,950
50–70	301–500	1,554–2,514
301–500	201–300	4,027–6,449
5,933–9,580	10,571–18,808	192,865–337,255+

U.S. EXPORTS OF IRON AND STEEL—YEAR 1947

(Net Tons)

Semi-Finished and Finished Products:	December	Year—1947
Ingots, blooms, billets, slabs, sheet bars	36,394	490,765
Wire rods	6,137	71,237
Skelp	3,338	67,403
Iron bars	453	34,755
Concrete reinforcement bars	17,469	248,205
Steel bars, cold finished	8,350	106,301
Other steel bars (excluding alloy)	37,948	535,421
Alloy steel bars	16,226	207,999
Welding rods, electric	1,724	14,844
Boiler plate	1,221	32,560
Other plates, not fab.	31,282	530,265
Plates, fab., punched or shaped	4,056	37,231
Iron sheets, black	1,574	30,216
Steel sheets, black	50,535	568,867
Galvanized sheets	5,172	74,603
Strip steel, cold rolled	7,643	89,621
Strip steel, hot rolled	8,398	106,850
Tin plate and taggers' tin	67,779	609,509
Terne plate (incl. long ternes)	1,523	12,851
Structural shapes, plain	51,949	754,182
Structural shapes, fab.		
Frames and sashes	7,782	42,830
Sheet piling		
Rails, 60 lbs. per yard and over	57,630	500,584
Rails, less than 60 lbs. per yard		
Rails, relaying		
Splice bars and tie plates		
Frogs and switches	12,665	157,820
Railroad spikes		
Railroad bolts, nuts, and washers		
Car wheels, tires and axles	4,784	88,646
Seamless black pipe	1,658	18,723
Seamless casing and oil line pipe	41,124	333,498
Seamless boiler tubes	7,958	69,955
Welded black pipe	5,235	91,133
Welded galvanized pipe	5,705	70,221
Welded casing and oil line pipe	*	*
Welded boiler tubes	*	*
Other pipe and fittings	9,003	101,853
Plain wire	8,018	84,382
Galvanized wire	10,102	101,026
Barbed wire	8,839	78,864
Woven wire fencing	1,037	12,378
Woven wire screen cloth	590	5,986
Wire rope and strand	1,049	30,785
Wire nails	1,719	25,755
Other wire and manufactures	4,543	52,068
Horseshoe nails	1,875	15,995
Tacks		
Other nails, incl. staples		
Bolts, nuts, rivets and washers, except railroad	4,674	48,325
Forgings	3,558	35,870
Horseshoes	16	900
TOTAL	558,735	6,591,282

* Included with seamless.
Source: United States Department of Commerce.

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UNIT OF NATIONAL STEEL CORPORATION

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GREAT LAKES STEEL CORP.

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Kaiser-Frazer announcement of 1948 models "at no increase in price" amuses motor-wise Detroiters. Production schedules cut back, procurement policies revised

DETROIT

ANNOUNCEMENT of 1948 models with 35 mechanical and body styling improvements and at "no increase in price," emanating from Kaiser-Frazer Corp., drew a hearty horse-laugh from the motor-wise Detroiters. The amusement sprang from the fact that only recently K-F dealers were calling for a $500 reduction in price to keep cars moving from their showrooms. Then, all of a sudden the dealers became happy, thanks to the ministrations of Vice President Edgar Kaiser and the appointment of a new sales manager, Fred Cooper, for the burgeoning Willow Run enterprise.

Coincident with all this, production schedules have been cut back to 850 daily, after original plans for 1500 per diem had been widely advertised. About 10 days' halt in plant operations was occasioned by the readjustment. At the moment, things are again serene among dealers, who are on record as supporting current prices, although many admittedly are looking to the spring skies for a little manna.

Buying Policies Revised—Meanwhile, procurement schedules at the K-F plant have come in for a considerable revision. For one thing, steel requirements have been cut back and the policy of bringing steel ingots from the plant of Kaiser in Fontana, Calif., for rolling into sheet and strip in midwestern mills has been dropped. In recent months an appreciable amount of steel for K-F cars has originated at the Fontana plant and a number of mills, including Great Lakes Steel Corp. here, have managed to work this semifinished material into sheet and strip for the K-F account. It was an expensive business, since a freight charge of around $37 per ton was involved in shipping the ingots east. Reports indicate the cost of the resultant flat-rolled material was around $200 per ton.

At the same time, K-F was feeding some of this steel to a number of principal parts suppliers, probably absorbing the extra cost involved in bringing ingots from California. Now this has been stopped, which fact doubtless gave rise to reports in the steel trade that "conversion" ingots were being dumped by an automobile company, with "few takers." Actually, the situation is not quite that bad. At least that is the opinion of the bulk of steel suppliers here, who report their order books are as jammed as ever with automotive requirements.

The readjustment of K-F schedules is generally considered a smart move, since it means a consolidation of the profit outlook for the company in the face of rough financial sledding. It was common knowledge around Detroit that the second shift at Willow Run was not producing, either through lack of adequate supervision or because the working force just did not feel like doing any work. The obvious remedy was to drop the extra shift and to effect economies in the single shift now on the job. This is being done.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

	1948	1947
January	422,277	366,205
February	400,577*	393,636
March		443,588
April		445,137
May		404,191
June		421,466
July		400,944
August		364,478
September		444,501
October		461,536
November		417,493
December		492,109
12 mos.		5,055,284

* Preliminary.

Estimates for week ended:

	1948	1947
Feb. 28	120,130	105,175
Mar. 6	108,343	104,378
Mar. 13	114,888	105,496
Mar. 20	115,000	108,472

Estimates by Ward's Automotive Reports

Changes Few—From a merchandising standpoint, the public announcement of new models with unchanged prices is calculated to give a boost to K-F sales. Changes are insignificant, but that is nothing new around Detroit which has seen a number of other 1948 models introduced with considerable fanfare and with little to distinguish them from their predecessors. Revisions in the Kaiser and Frazer lines are stated to encompass 25 mechanical and 10 body design features. They include an increase in the compression ratio of the engine from 6.86:1 to 7.30:1, introduction of the new large-diameter low-pressure tires, heavier shock absorbers and springs, a triple-tooth roller gear to improve steering control, relocation of the fuel pump, and exhaust outlet to minimize the possibility of vapor lock, and adoption of an aluminum master brake cylinder instead of cast iron.

General Motors Reports

With several rolls of the publicity drums, the annual financial report for 1947 of General Motors Corp. has been unfurled, revealing net sales at a peacetime record level of better than $3.8 billion, yielding a tidy net income of close to $288 million, or the equivalent of $6.24 per share of common stock, better than three times the net of 1946. The GM tax bill, incidentally, almost matched the profit record, being the equivalent of $5.92 per share of common stock.

The report also observes that aggregate sales of locomotives, diesel engines, refrigerators and other nonautomotive products last year represented a higher proportion of the total volume than prewar years, and also that any analysis of sales figures "must also give consideration to the existing level of prices, which is importantly above prewar, with the result that an increase in dollar volume over previous years does not in itself reflect a comparable increase in physical volume."

Materials Limit Output—Continuing, the GM report notes that "large-scale production requires a continuous supply of large quantities of materials, and scarcities often penalize the larger companies more than the smaller ones. Before the war a company's share of the market depended on customer preference. In 1947 it depended to a great degree on the amount of materials a company could obtain, since many customers bought the cars on which they could get quickest delivery."

The report lists three causes of

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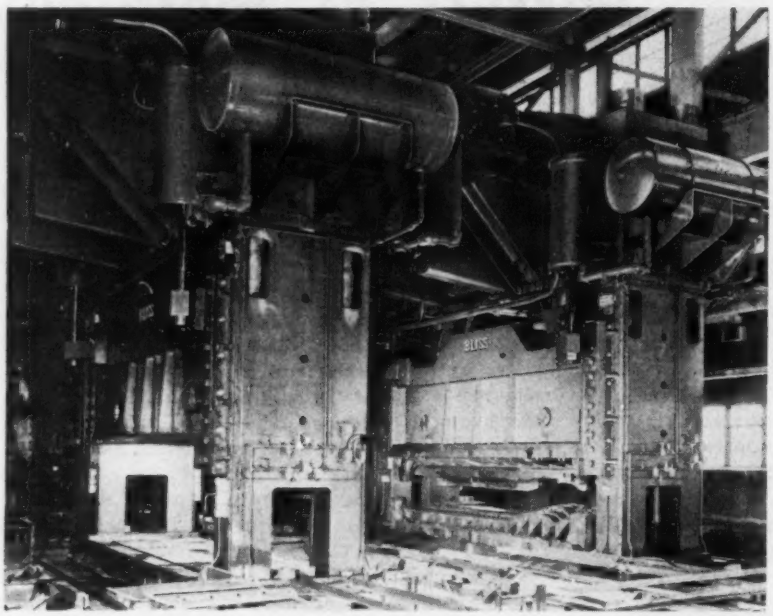


2000-TON PRESSES: As part of Ford Motor Co.'s $100 million retooling program for 1949 models, these two giant Bliss presses have just been installed at the Rouge plant. Each is designed to exert 2000 tons pressure in forming rails for automobiles and trucks

the high-pressure demand for automobiles in 1947—greater family income, population increase and the need for replacing over-age cars still in use. The average age of cars had increased to 8.5 years at the beginning of 1947, from 5.3 years before the war.

The postwar program of General Motors, begun immediately following the war, was brought to virtual completion during 1947, approximately 2½ years after work actually got under way. It involved expenditures of about $900 million for plants and facilities, including special tools, and it was designed to "provide improved and expanded facilities where necessary for more efficient operations and a better balance of capacity for the postwar manufacture of products, as well as improvement in engineering, distribution, research and employee facilities."

Urges Tax Limit—Coincident with the release of the financial report, Alfred P. Sloan Jr., chairman of GM, urges a 50 per cent limit on the aggregate tax on business profits and individual incomes. He observes that excessive or confiscatory business taxes serve to increase prices, and hence diminish consumption and reduce employment.

Says Mr. Sloan: "Expansion in capacity, rehabilitation of facilities in terms of technological progress, development of new products, increased need of working capital, all requiring 1½ to 2 dollars where one dollar previously sufficed, are resulting in a great strain on existing capital structures. Capital formation flows from the savings of business and individuals. Prudent management requires that a part of profits are retained for capital needs. But a large part of the funds needed should be provided through equities . . venture capital in other words. Under existing tax laws a very real doubt exists as to the availability of such capital in sufficient amounts to meet the needs of a dynamic economy."

Pushes Scrap Campaign

Willys-Overland has launched a campaign in Toledo, with the support of city authorities and local scrap dealers, to urge various organizations to assist in collection of dormant scrap metal. Full-page newspaper advertisements have been sponsored and instructions issued on how to organize scrap collection projects and how to sell accumulated material.

Merge Synthetic Fuel Programs

Cities Service Co. and M. W. Kellogg Co. reveal a merger of their respective synthetic fuel programs has been in effect since 1946 and that Kellogg is now prepared to license synthetic fuel plants on behalf of both companies.

In a joint statement the two firms report that successful incorporation of advancements made by both companies in their latest pilot plants at Lake Charles, La., Tallant, Okla., and Jersey City, N. J., demonstrate the economic possibilities of the process to date.

Initial research by the Cities Service organization in the production of chemicals from natural gas by means of direct oxidation was begun in 1926. The company is a major producer of natural gas, with 154 billion cu ft turned out during 1947. Its reserves are large and represent an important potential source of raw material for the production of synthetic fuels.

Kellogg began its research into the synthesis of liquid fuel in the 30's.

Forms Foreign Subsidiaries

Formation of two foreign manufacturing subsidiaries and other steps to expand the sale of hydraulic shock absorbers in world-wide markets has been announced by Brouwer D. McIntyre, president and general manager of Monroe Auto Equipment Co., Monroe, Mich.

The two subsidiaries, which are expected to attain a combined production of more than 5000 shock absorbers per day, are Monroe-Acme Ltd., Toronto, Canada, established by Monroe and Canadian-Acme Screw & Gear Ltd., Toronto, and Woodhead-Monroe Ltd., Leeds, England, formed by Monroe and Woodhead Components Ltd.

In addition, Mr. McIntyre revealed that Monroe has developed its affiliations with Chrysler-Dodge Distributors, Adelaide, Australia, now in production of Monroe-designed shock absorbers, and Premier Automobiles Ltd., Bombay, India, soon to begin manufacturing activities.

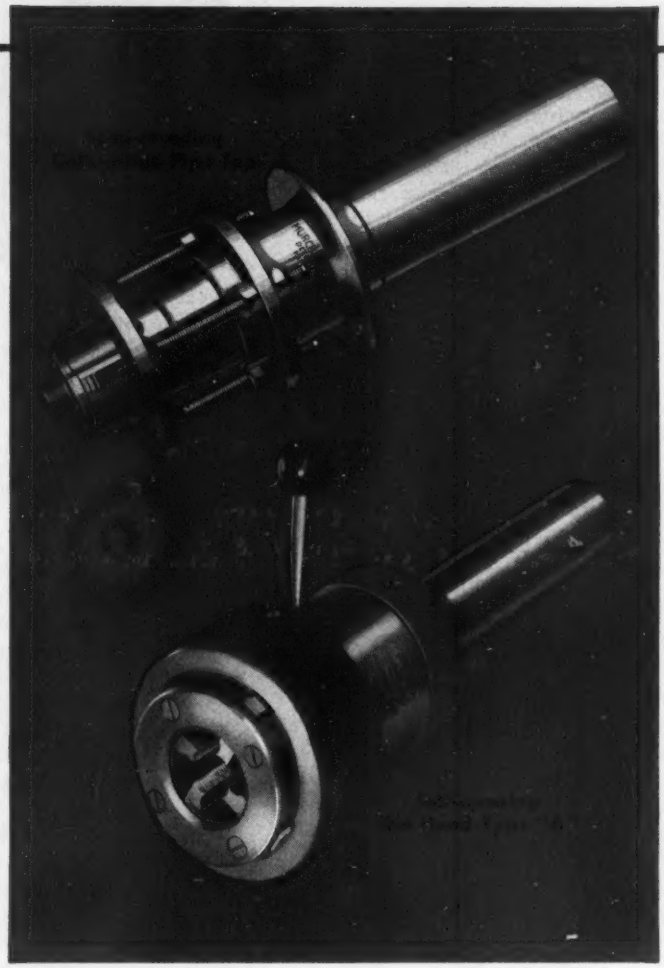
Strip Roll Demand Strong

Unrelenting demand for high alloy strip mill rolls is bound to continue well into 1949, according to J. R. Patterson, vice president in charge of sales for Mackintosh-Hemphill Co., Pittsburgh.

Pointing out that the high demand for cars, cabs for trucks, and trailer bodies has resulted in a scarcity of steel sheets, Mr. Patterson emphasized that an exceptional production schedule was being maintained by strip producers in an effort to correlate supply with demand.

In an effort to catch up with demand, Mackintosh-Hemphill, he revealed, is planning plant improvements for 1948. The firm is endeavoring to secure new mechanical equipment and is constructing new tool room facilities at its Garrison plant in Pittsburgh.

A BETTER, MORE ECONOMICAL METHOD OF THREADING PIPE



The Murchey Pipe Tap

illustrated is a semi-receding, collapsible unit for cutting taper threads from 1¼" to 7" in diameter in cast iron or other materials of similar hardness. Larger sizes are available. For harder materials, the Murchey full receding tap is preferable. Either is used on standard automatic screw machines, drill presses, turret lathes, hand screw machines and special threading machines. These tools can also be arranged to cut straight threads. Both are available in the lever-operated or rotating type.

The Murchey Pipe Die

Types A and C are used for cutting taper pipe threads from ⅛" to 6". Larger sizes are also available. Type A is a stationary pull-off unit for use on machines where the tool is stationary.

Type C is a yoke-operated tool for use on machines which rotate the tool. Excellent production records have been achieved by these tools on a wide range of pipe threading work.

2935

Consult a Murchey Engineer

MURCHEY MACHINE & TOOL CO.
Detroit 26, Mich.

Lowest cost per thread . . .

MURCHEY

SUBSIDIARY OF THE SHEFFIELD CORP.
DAYTON 1, OHIO, U. S. A.

Manufacturers of collapsible taps, self-opening die heads (tangent and radial chaser types) and special threading tools

Steel Facilities Now Operate In 27 States

STEELMAKING facilities today exist in 27 states, compared with a geographical dispersion in only 24 states at the time of the attack on Pearl Harbor, according to the American Iron & Steel Institute. In addition to this greater dispersion, several western and southern states have risen in importance as steelmaking areas.

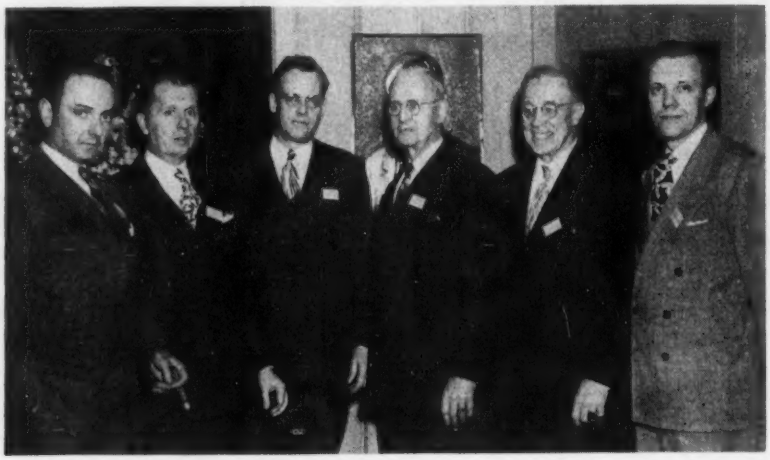
Current capacities of states in these western and southern sections are: Texas, 582,320 net tons; Utah, 1,283,400; Washington, 346,800; Alabama, 3,634,400; and California, 2,101,200. On Dec. 31, 1941, capacities were: Texas, 9000 net tons; Utah, none; Washington, 197,400; Alabama, 3,416,000; and California, 1,044,920. In six years, the steelmaking capacities in these states had almost doubled from 4,500,000 net tons to about 8 million. National steel facilities during that period were being increased by about 6½ per cent.

Tennessee, Oregon Added—Tennessee and Oregon were two more states added to the list of ingot-making areas, although their capacities were relatively small at 38,000 and 66,100 net tons, respectively. Despite these shifts, Pennsylvania retains its position as the leading state, with a capacity of 28,101,230 net tons. Over 3,500,000 net tons of new capacity were added in that state during the 1940-48 period.

Ohio continues as second largest with a capacity of 18,769,010 net tons, while Indiana and Illinois follow next in order (the same as prewar) with capacities of 11,110,300 and 8,304,020 net tons, respectively.

Maryland, Alabama Advance — Maryland advanced from sixth to fifth place with 4,746,000 net tons of capacity, displacing New York which has 4,319,900 net tons. Alabama advanced to seventh place from eighth, replacing Michigan which has a 3,473,100-net-ton capacity. West Virginia continued in ninth place with an enlarged capacity of 2,286,000 net tons, while California and Utah took tenth and eleventh place, respectively, edging out Colorado which followed in order with 1,272,000 net tons.

Of the remaining states, those which showed relatively minor changes included Kentucky, Delaware, Connecticut, Georgia, New Jersey, Oklahoma and Rhode Island. Virginia's steelmaking capacity tripled to 7500 net tons; Minnesota's more than doubled to 690,000 net tons, while that of Missouri was reduced by 25 per cent.



WELCOME VISITORS: On hand to greet visitors at the open house of Kropp Forge Co., Chicago, recently were, left to right: Leo T. Norville, director; Roy A. Kropp, president; Preston C. Patch, director of purchases; C. F. Johnson, secretary; James E. Sweeney, vice president and general sales manager; and Victor Brown, director of research

Hundreds of Steel Communities—Ingot-making facilities are located in 112 communities. Finishing facilities are in 226 communities scattered through 29 states. Communities in Pennsylvania, Ohio, Indiana and Illinois, combined, account for 70.3 per cent of the ingot-making capacity. Pennsylvania, alone, has 29.8 per cent of the U. S. total.

Finished steel products are made in the following states:

Alabama: Shapes, plates, rails, splice bars, track spikes, hot-rolled and concrete bars, wire rods, wire, black plate, tin and terne plate, hot-rolled and galvanized sheets, hot-rolled strip, axles, bolts, nuts, rivets and washers.

California: Shapes; plates; splice bars; track spikes; hot-rolled, concrete and cold-finished bars; skelp; pipe and tubes; wire rods; wire; tin and terne plate; hot-rolled and galvanized sheets; hot and cold-rolled strip; bolts, nuts, rivets and washers.

Colorado: Shapes, plates, rails, splice bars, track spikes, hot-rolled and concrete bars, wire rods, wire, hot-rolled strip, bolts, nuts, rivets and washers.

Connecticut: Cold-finished bars, wire, hot and cold-rolled strip.

Delaware: Plates.

Georgia: Hot-rolled and concrete bars, wire rods, wire, hot-rolled and galvanized strip, bolts, nuts, rivets and washers.

Illinois: Shapes; plates; splice bars; track spikes; hot-rolled, concrete, tool steel and cold-finished bars; skelp; rounds for seamless; pipe and tubes, wire rods; wire; tin and terne plate; hot-rolled, cold-rolled and galvanized sheets; hot-rolled, cold-rolled and galvanized strip; bolts, nuts, rivets and washers.

Indiana: Shapes; piling; plates; rails; splice bars; track spikes; hot-rolled, concrete and cold-finished bars; skelp; rounds for seamless; pipe and tubes; wire rods; wire; black plate; tin and terne plate; hot-rolled, cold-rolled, galvanized and long terne sheets; hot and cold-rolled strip; axles; bolts, nuts, rivets and washers.

Iowa: Wire.

Kentucky: Plates; hot-rolled bars; hot-rolled, galvanized and long terne sheets.

Maryland: Plates; rails; hot-rolled, concrete, cold-finished bars; skelp; pipe and tubes; wire rods; wire; black plate; tin and terne plate; hot-rolled, cold-rolled and galvanized sheets.

Massachusetts: Hot-rolled, concrete and cold-finished bars; wire rods; wire; cold-rolled and galvanized strip.

Michigan: Plates; hot-rolled, concrete and cold-finished bars; rounds for seamless; pipe and tubes; wire rods; wire; hot and cold-rolled sheets; hot and cold-rolled strip.

Minnesota: Shapes, hot-rolled bars, wire rods, wire, hot-rolled strip.

Missouri: Plates; track spikes; hot-rolled, concrete and cold-finished bars; wire rods; wire; hot-rolled sheets; bolts, nuts, rivets and washers.

New Jersey: Hot-rolled, tool steel, and cold-finished bars; pipe and tubes; wire rods; wire; hot-rolled, cold-rolled and galvanized strip; bolts, nuts, rivets and washers.

New York: Shapes; piling; plates;

rails; splice bars; hot-rolled, concrete, tool steel and cold-finished bars; pipe and tubes; wire rods; wire; hot-rolled, cold-rolled and galvanized sheets; hot and cold-rolled strip; bolts, nuts, rivets and washers.

Ohio: Shapes; plates; rails; splice bars; track spikes; hot-rolled, concrete, tool steel, and cold-finished bars; skelp; rounds for seamless; pipe and tubes; wire rods; wire; black plate; tin and terne plate; hot-rolled, cold-rolled, galvanized and long terne sheets; hot-rolled, cold-rolled and galvanized strip; bolts, nuts, rivets and washers.

Oklahoma: Hot-rolled and concrete bars.

Oregon: Hot-rolled bars.

Pennsylvania: Shapes; piling; plates; rails; splice bars; track spikes; hot-rolled, concrete, tool steel and cold-finished bars; skelp; rounds for seamless; pipe and tubes; wire rods; wire; black plate; tin and terne plate; hot-rolled, cold-rolled, galvanized and long terne sheets; hot-rolled, cold-rolled and galvanized strip; wheels; axles; bolts, nuts, rivets and washers.

Rhode Island: Wire rods, wire, hot and cold-rolled strip.

Tennessee: Shapes; hot-rolled, concrete and tool steel bars; hot-rolled strip.

Texas: Shapes, plates, hot-rolled and concrete bars, wire rods, wire, hot-rolled sheets.

Utah: Shapes, plates.

Virginia: Splice bars, track spikes, hot-rolled bars, axles.

Washington: Shapes, plates, splice bars, track spikes, hot-rolled and concrete bars, bolts, nuts, rivets and washers.

West Virginia: Shapes; rails; splice bars; track spikes; hot-rolled, and concrete bars; skelp; pipe and tubes; black plate; tin and terne plate; hot-rolled, cold-rolled, galvanized and long terne sheets; hot and cold-rolled strip.

Wisconsin: Hot-rolled and cold-finished bars; pipe and tubes, wire. hot-rolled strip.

Portsmouth's New Sheet Mill Booked to Capacity

The new sheet mill of Portsmouth Steel Corp., Portsmouth, O., is booked to capacity, and it probably will be impossible to take additional tonnage before midyear, according to Harold J. Ruttenberg, vice president. The mill will be in full operation early next month and has an estimated annual capacity of 100,000 tons.

Briefs . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

S. P. Kinney Engineers Inc., Pittsburgh, has appointed Shook & Fletcher Supply Co., Birmingham, as sales representative in Alabama for Kinney's blast furnaces and steel plant equipment.

—o—

McKay Co., York, Pa., manufacturer of welding electrodes, has appointed Johnson Welding Equipment Co., Chicago, as its distributor in the Chicago area.

—o—

Kerrigan Iron Works Inc., Nashville, Tenn., manufacturer of grating, stair treads and pole line hardware, has moved its New York office to 299 Madison Ave.

—o—

Braeburn Alloy Steel Corp., Braeburn, Pa., producer of tool steels, has appointed P. D. Browne Co., Dallas and Houston, Tex., as its distributor in Texas and Oklahoma.

—o—

Standard Transformer Co., Warren, O., maker of power, distribution, instrument, street lighting and testing transformers, has appointed Southwestern Co., Phoenix, Ariz., as a distributor in Arizona and Utah.

—o—

Criterion Machine Works, Beverly Hills, Calif., manufacturer of boring tools, has named Wendt-Sonis Co., Hannibal, Mo., as its national distributor.

—o—

Michiana Products Corp., Michigan City, Ind., has occupied a new laboratory designed for study of pilot castings and development of new foundry techniques.

—o—

United States Rubber Co., New York, has developed a sheet material for pressure regulator diaphragms made from nylon fabric combined with rubber. Sheets can be die cut to fit various pressure regulators.

—o—

Westinghouse Electric Corp., Pittsburgh, is building a main line railroad locomotive powered with a gas turbine electric drive. The locomotive will incorporate much of the knowledge gained in designing and building jet propulsion power plants for high speed aircraft.

—o—

Symington-Gould Corp., Rochester, N. Y., manufacturer of steel castings for railroad, automotive and industrial uses, will discontinue all operations at its Rochester plant upon completion of unfilled orders. Future operations will be concentrated at the Depew, N. Y., plant. Company officials said operations in the Rochester facility were unprofitable.

—o—

Allis-Chalmers Mfg. Co., Milwaukee, has appointed Meier Transmission Co., Cleveland, as its distributor in Cleveland for mechanical and electrical equipment.

—o—

General Electric Co., Schenectady, N. Y., has purchased a plant at 1099 Ivanhoe Rd., Cleveland, from Aluminum Co. of America for approximately $300,000. GE will use the quarters for its Chemical Products Division.

—o—

Bethlehem Supply Co. of California, subsidiary of Bethlehem Steel Co., recently held an open house to open its new general office and main warehouse at 6000 Alcoa Ave., Vernon, Calif.

—o—

University of Illinois will hold a short course on packaging and materials handling in conjunction with the Third Annual Industrial Packaging and Materials Handling Exposition, which will run from Oct. 5-7 at Hotel Sherman, Chicago.

—o—

Albert Kahn Associated Architects & Engineers Inc., Detroit, reports that it has designed more than 20 million sq ft of new floor space for production plants since V-J Day. Kahn-designed structures include eight automobile assembly plants, five prime automotive manufacturing layouts, automotive administration buildings, a ball bearing plant and others.

—o—

Pyrometer Instrument Co., maker of pyrometers, has moved to its new plant, laboratory and office at Bergenfield, N. J.

—o—

Garrick Industries Inc. has been newly formed at 2893 S. Robertson Blvd., Los Angeles, as a firm specializing in the sale, design and manufacture of materials handling equipment. Company will make special items and will also act as a sales representative for materials handling equipment manufacturers.

The Business Trend

STABILIZATION of industrial activity at a relatively high level characterized the four-week period ended Mar. 13, with STEEL's index of industrial production hovering near the latest week's level of 167 per cent of the 1936-1939 weekly average. Continuance of this rate of operations in basic industries appeared impaired last week, however, by a spreading walkout of coal miners, responding to their chieftain's assertion that the mine operators had "dishonored" their contract.

COAL—Production of soft coal had shown a rising trend since the final week in January when cold weather slowed car movements, halted barge shipments and interrupted mining operations. It had moved upward from the low of 11,190,000 net tons produced in the week ended Jan. 31, until in the week ended Mar. 6, estimated production, according to the Bureau of Mines, was 13,025,000 net tons. This output compared with 12,807,000 net tons produced in the like 1947 week.

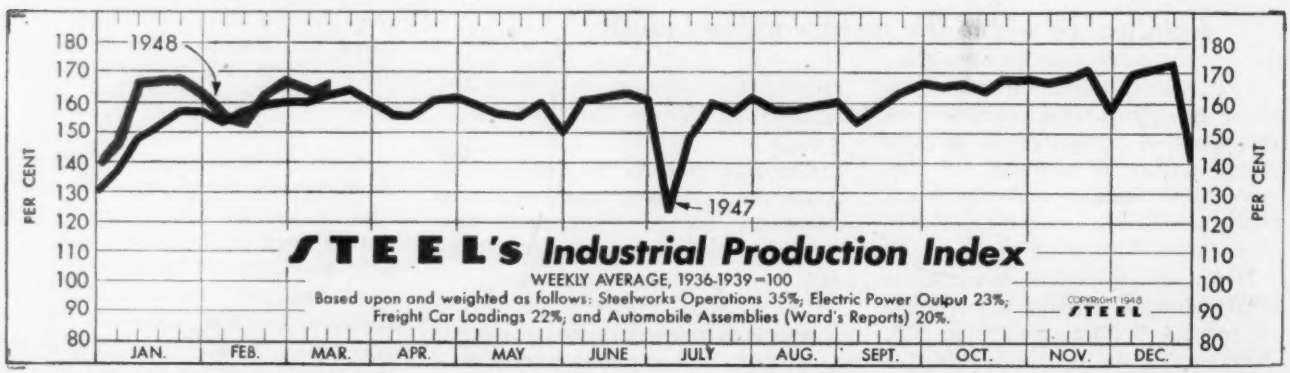
STEEL—Operating rate of the steel industry rose one point to 95.5 per cent of capacity in the week ended Mar. 13. Dashing of the industry's hopes for further increases in production would follow any protracted suspension of coal mining. Meanwhile raw materials generally continue as a primary choke-point to greater steel output.

AUTOS—Production schedules in the automotive industry remain closely geared to supply of sheets and pig iron, with the latter scarce enough recently to force a temporary abandonment of replacement parts manufacturing programs in parts of the industry. In the week ended Mar. 13, car and truck output in the United States and Canada, as estimated by *Ward's Automotive Reports,* jumped to 114,888 units, a gain of 6545 from the previous week.

PRICES—Hesitancy in wholesale price movement a week earlier was dispelled in the week ended Mar. 6 with most farm products and some foods going to higher levels. Bureau of Labor Statistics reports its index advanced 0.8 per cent for all commodities to 160.4 per cent of the 1926 average. This latest figure is 2.1 per cent below the level in the week preceding the recent commodity market slump.

CONSTRUCTION—Seasonal decline in construction activity continued in February, with shrinkage in employment and in the dollar volume of work put in place noted by Bureau of Labor Statistics. Employment at 1,607,000 was 85,000 less than in January, and expenditures of $1.1 billion in the month were 10 per cent below the January total.

FOREIGN TRADE—Although United States' imports in January, as reported by the Bureau of the Census, were off 10 per cent from the unusually high level of December, the latest month's total of $543.7 million was 14 per cent above last year's average. Total exports amounted to $1,099.8 million. Omitting shipments for the Army Civilian Supply Program of $81.4 million, hitherto not included in the total, exports were 8 per cent lower than in December.



Index (chart above): Week ended Mar. 13 (preliminary) 167 Previous Week 166 Month Ago 157 Year Ago 162

BAROMETERS of BUSINESS

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	95.5	94.5	93.0	95.0
Electric Power Distributed (million kilowatt hours)	5,285	5,293	5,385	4,764
Bituminous Coal Production (daily av.—1000 tons)	2,170	2,152	1,920	2,134
Petroleum Production (daily av.—1000 bbl.)	5,265	5,353	5,347	4,844
Construction Volume (ENR—Unit $1,000,000)	$96.0	$183.9	$133.5	$103.3
Automobile and Truck Output (Ward's—number units)	114,888	108,343	83,996	105,496

* Dates on request. † 1948 weekly capacity is 1,802,476 net tons. 1947 weekly capacity was 1,749,928 net tons.

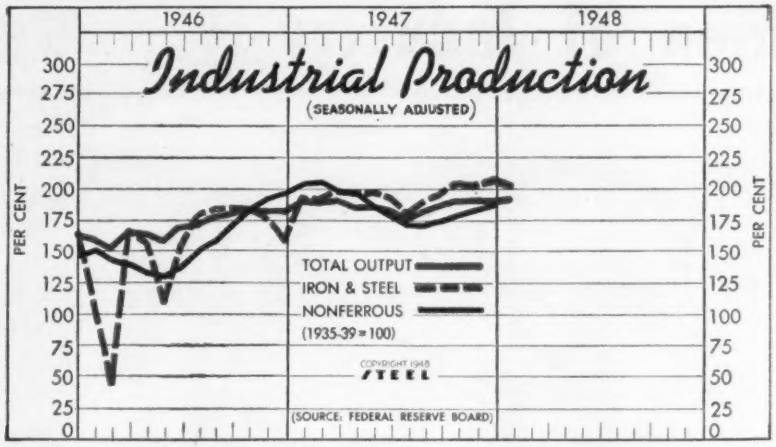
TRADE				
Freight Carloadings (unit—1000 cars)	800†	792	734	841
Business Failures (Dun & Bradstreet, number)	102	113	128	51
Money in Circulation (in millions of dollars)‡	$28,006	$28,024	$28,189	$28,330
Department Store Sales (change from like wk. a yr. ago)‡	+4%	+4%	+9%	+9%

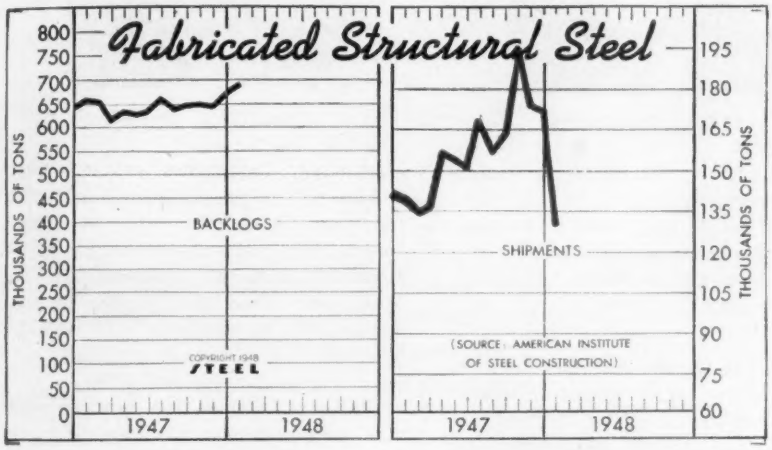
† Preliminary. ‡ Federal Reserve Board.

Federal Reserve Board's Production Indexes

(1935-39=100)

	Total Production		Iron, Steel		Nonferrous	
	1948	1947	1948	1947	1947	1946
Jan.	192	189	202	192	203	150
Feb.	...	189	...	191	205	141
Mar.	...	190	...	196	199	139
Apr.	...	186	...	195	197	132
May	...	185	...	197	187	128
June	...	184	...	193	179	137
July	...	177	...	181	172	151
Aug.	...	182	...	188	171	159
Sept.	...	186	...	195	174	172
Oct.	...	190	...	204	179	184
Nov.	...	192	...	202	184	192
Dec.	...	192	...	205	188	197
Ave.	...	187	...	196	186	157





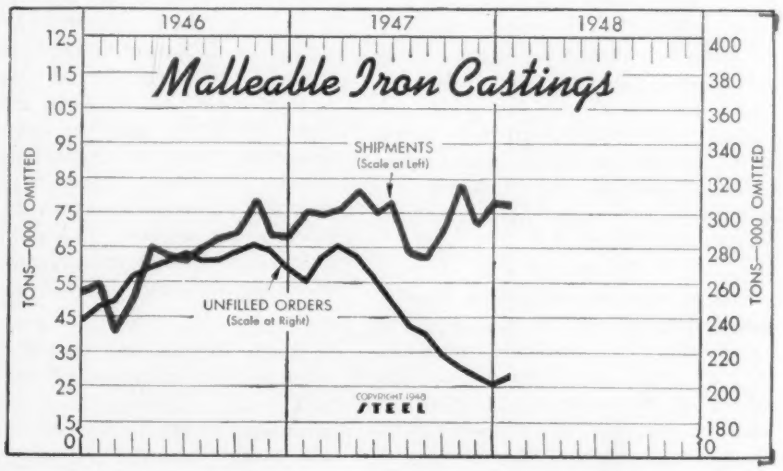
Fabricated Structural Steel

(000 Tons)

	Shipments			Backlogs		
	1948	1947	1946	1948	1947	1946
Jan.	130.9	140.6	107.5	692	661	552
Feb.	....	136.1	63.8	...	656	551
Mar.	....	137.8	102.8	...	614	605
Apr.	....	157.4	122.5	...	632	674
May	....	155.0	124.4	....	628	615
June	....	151.9	126.8	...	634	642
July	....	169.9	140.2	...	661	674
Aug.	....	158.0	157.5	...	639	651
Sept.	....	164.3	141.9	...	648	682
Oct.	....	196.1	164.7	...	649	660
Nov.	....	175.0	157.3	...	645	665
Dec.	....	173.0	142.1	...	671	646
Total	....	1,915.1	1,551.6			

Malleable Iron Castings

	Shipments (000 omitted)		Unfilled orders for castings for sale (000 omitted)	
	1948	1947	1948	1947
Jan.	77.7	75.9	206	260
Feb.	...	74.7	...	274
Mar.	...	76.6	...	281
Apr.	...	81.9	...	275
May	...	75.5	...	262
June	...	78.5	...	249
July	...	64.2	...	235
Aug.	...	62.4	...	230
Sept.	...	71.6	...	218
Oct.	...	84.0	...	211
Nov.	...	72.1	...	206
Dec.	...	77.8	...	202
Total	...	895.1		



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,760	$14,451	$12,455	$11,984
Federal Gross Debt (billions)	$254.1	$254.2	$254.7	$260.8
Bond Volume, NYSE (millions)	$16.0	$18.6	$16.8	$17.3
Stocks Sales, NYSE (thousands)	3,987	3,827	4,813	4,808
Loans and Investments (billions)†	$63.5	$64.0	$64.9	$63.7
United States Gov't. Obligations Held (millions)†	$35,845	$36,281	$37,315	$40,159

† Member banks, Federal Reserve System.

PRICES

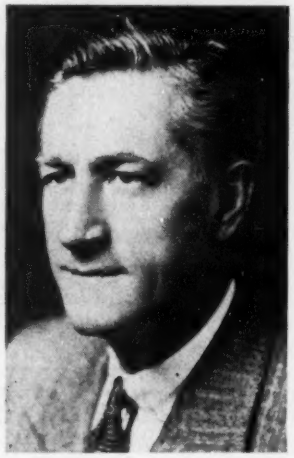
STEEL's composite finished steel price average	$81.14	$81.14	$78.59	$69.82
All Commodities†	160.4	159.2	163.8	148.7
Industrial Raw Materials†	176.5	173.9	182.3	162.5
Manufactured Products†	154.3	153.5	156.7	143.7

† Bureau of Labor Statistics Index, 1926=100.

Men of Industry

ANDREW A. PRIEST

DR. JOHN M. PEARSON



WALTER C. LEITCH

Thomas A. Edison Inc., Instrument Division, West Orange, N. J., announces appointment of **Andrew A. Priest** as factory manager. Mr. Priest has had management experience during the past 20 years with such firms as General Electric Co., Westinghouse Electric Corp., National Union Radio, and RCA.

—o—

William S. James, who resigned recently as director of research for Ford Motor Co., Dearborn, Mich., a position he held since April, 1946, after leaving Studebaker Corp., has been appointed vice president in charge of engineering for Fram Corp., Providence, R. I., manufacturer of oil, gasoline and air filters. He is a past president of the Society of Automotive Engineers.

—o—

Jan M. Krol, consultant in foundry practice and development engineer in hot-pressing and vacuum techniques for the cemented carbide field, and **Robert L. Pettibone,** specialist in the heat treatment of powder metal parts, announce their affiliations with Sintercast Corp., New York, as chief metallurgical engineer and research metallurgist, respectively. They will work under **Dr. Claus G. Goetzel.**

—o—

Frank B. Newbert has been appointed assistant general purchasing agent for American Brake Shoe Co., New York. He has been with the company since 1934, and has served in various purchasing capacities.

—o—

Diamond Alkali Co., Cleveland, announces promotion of **A. H. Ingley** to vice president in charge of operations; **M. O. Kirp** to general manager of the Painesville, O., plant succeeding Mr. Ingley; and **James E. Spaude** to assistant controller of the firm. The company also announces that company headquarters have been moved from Pittsburgh to Cleveland, effective Mar. 22.

—o—

Dr. U. R. Evans and **Dr. John M. Pearson** have been named recipients of the 1948 awards of the National Association of Corrosion Engineers, New York. Dr. Evans has been honored with the Willis Rodney Whitney Award in corrosion science, and Dr. Pearson with the Frank Newman Speller Award in corrosion engineering. Dr. Evans has been engaged in scientific work at Cambridge University, England, since 1919. Dr. Pearson is connected with the Sun Oil Co. as director of its Physical Division of the research and development department.

—o—

E. H. Phillips has been appointed general sales manager of Pittsburgh Gear Co., Pittsburgh. Formerly manager of Mine Gear & Parts Division, he joined the company in 1941 in a sales capacity. **Francis Knuth** has been appointed controller of the company. He had held a similar post for many years with the General Armature & Mfg. Co., Lock Haven, Pa.

—o—

Consolidating its facilities in the Chicago territory, Yale & Towne Mfg. Co., Philadelphia, announces unification of all sales and service facilities in behalf of its electric truck, handlift truck, and dial scale divisions at the Railway Exchange Bldg., Chicago, under **Arthur H. Dobler,** regional manager. **S. A. March** will continue in advisory and consulting capacities. With Mr. Dobler will be the following material handling specialists: **C. M. Barteleme,** regional sales manager; **T. J. Brunswick, E. E. Johnson, H. L. Marquard, Fred P. Mignin, R. A. Rieger, W. R. Saunders** and **Roy L. Wolter.**

—o—

Walter C. Leitch has been elected vice president and general manager of the Aro Equipment Corp., Bryan, O. Since 1921, Mr. Leitch has been associated with Gilbert & Barker Mfg. Co., Springfield, Mass., subsidiary of Standard Oil Co. of New Jersey, and most recently as general sales manager of that company.

—o—

Carnegie-Illinois Steel Corp., subsidiary of U. S. Steel Corp., announces the promotion of **David C. Affleck** as assistant chief engineer of the Gary, Ind., Steel Works. He had previously been general supervisor of project engineering for the subsidiary, and has been associated with the U. S. Steel Corp. subsidiaries for the last 24 years.

—o—

Lester Hamill has been promoted by Pitney-Bowes Inc., Stamford, Conn., as manager of sales administration for this manufacturer of postage meters. He joined the firm in 1935.

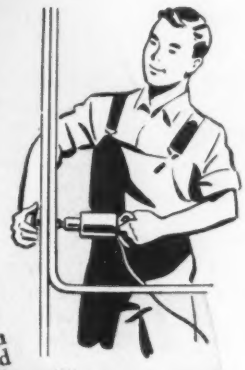
—o—

Walter M. Skillman has been appointed sales manager of standard line radios for the Receiver Division at Electronics Park, Syracuse, N. Y., of General Electric Corp.

—o—

Hallie Ensign, who has been assistant comptroller of the Willard Storage Battery Co., Cleveland, has been promoted to comptroller. In

Which of These Speed Nut* Advantages Will Profit You Most?



✓ APPLIED FASTER

SPEED NUTS start easily, run freely on threads, and tighten into a Double-Locked position *without being held with a wrench.* The push-on types zip over unthreaded studs even faster.

✓ ELIMINATE ASSEMBLY STEPS

Many types of SPEED NUTS hold themselves in bolt-receiving positions—no welding, clinching, or riveting necessary. Also, SPEED NUTS require no masking before painting, no tapping of threads after painting.

✓ PERFORM MULTIPLE FUNCTIONS

One multi-purpose SPEED NUT often replaces two, three, or more parts, thereby eliminating assembly steps and reducing time and material costs.

● Today, SPEED NUTS are cutting assembly costs for thousands of users. Example: One manufacturer of motion picture cameras and projectors reports a 36% saving ... thanks to SPEED NUTS.

You, too, can counteract rising manufacturing costs by applying the SPEED NUT System of Fastenings to your product.

Tinnerman engineers are prepared to conduct a fastening analysis from your blue prints or actual assemblies. Complete information on this service, plus your copy of the new SPEED NUT bulletin, will be sent on request. TINNERMAN PRODUCTS, INC., 2038 Fulton Rd., Cleveland 13, Ohio.

In Canada: Dominion Fasteners Limited, Hamilton
In England: Simmonds Aerocessories, Ltd., Treforest
In France: Aerocessoires. Simmonds, S. A., Paris

TINNERMAN

Speed FASTEST THING IN FASTENINGS *Nuts*

*Trade-Mark Reg. U. S. Pat. Off.

MORE THAN 4000 SHAPES AND SIZES

assuming this position Mr. Ensign takes over the responsibilities of **Charles Gibney,** who held the positions of vice president, secretary and comptroller, and in relinquishing the latter position, has more time for expanded executive-management problems.

—o—

Charles Locke, formerly chief metallurgist and foundry superintendent for the West Michigan Steel Casting Co., has joined the metals research department of Armour Research Foundation of Illinois Institute of Technology. **Roy D. Hayworth** has been appointed supervisor of abrasion research for the foundation. He joined the metals research staff in 1946, and until recently was responsible for the development of research programs in both foundry processes and abrasion.

—o—

Dr. John A. Hutcheson has been appointed director of the Westinghouse Research Laboratories, Westinghouse Electric Corp., Pittsburgh. He succeeds **Dr. L. Warrington Chubb,** who has retired from active direction of the laboratories for reasons of health, but who has been named director emeritus, and will continue to serve in an advisory capacity. Dr. Hutcheson assumes his new post after four years as associate director of the laboratories, during which time he directed the company's wartime radar research program and later the formulation of plans for atomic energy development. He will remain active in both fields.

—o—

C. D. Alderman has been named sales manager of Mullins Mfg. Corp.'s Youngstown Kitchen Division in Warren, O. He succeeds **Frank W. Knecht Jr.,** who has been promoted to staff assistant. **David F. Rucks Jr.** has been named to succeed Mr. Alderman as assistant manager of sales.

—o—

H. A. Lundberg has been appointed Syracuse, N. Y., district sales manager of the Mechanical Goods Division, United States Rubber Co., New York, succeeding **Clarence D. Townsend,** retired after 42 years' service. Mr. Lundberg has been with the company since 1936, and has held various sales positions in Dallas, Kansas City, New Orleans and most recently in Chicago.

—o—

Edward O. Burgham has been promoted to general superintendent of the Weirton Steel Co., Weirton, W. Va. He has been assistant general superintendent since 1944. He succeeds **Clyde E. Bayer,** recently promoted and transferred to Great Lakes Steel Corp., Detroit, which, like Weirton Steel Co., is a division of National Steel Corp.

—o—

Superior Tube Co., Norristown, Pa., announces the following changes in its executive positions: **S. L. Gabel** has resigned as general manager of the company, but will be retained as administrative consultant. **Clarence A. Warden,** president, has resigned, but continues as chairman of the board. **Clarence A. Warden Jr.,** formerly vice president and secretary, has been elected president. **Richard H. Gabel** will continue as vice president in charge of plant operations, and **Paul E. Kelly** has been elected secretary, which position he will combine with his former position of treasurer.

—o—

Wagner Electric Corp., St. Louis, announces transfer of **Fred Pasher** from the position of manager of its Cleveland branch to that of manager of the Dallas, Tex., branch, succeeding the late **B. B. Pierce.** Manager at Cleveland for the past three years, Mr. Pasher had previously been manager of the Boston branch from 1927 to 1945. He is succeeded at Cleveland by **Elmer Gent,** automotive salesman in the Pittsburgh area.

—o—

Charles J. Reimer has been appointed general purchasing agent for SKF Industries Inc., Philadelphia. Formerly procurement metallurgist, Mr. Reimer succeeds **J. F. Whelihan,** resigned. Prior to joining SKF in 1944, Mr. Reimer had been superintendent of the Heppenstall Co.'s forge shop at Eddystone, Pa.

—o—

John A. Sauer will resign as president of Symington-Gould Corp., Rochester, N. Y., effective May 1.

—o—

C. S. Stackpole has been named vice president and general manager of the Airtemp Division, Chrysler Corp., Detroit.

—o—

Fred R. Cooper, sales director, has been appointed vice president in charge of sales, Kaiser-Frazer Corp., Willow Run, Mich., succeeding **W. A. MacDonald,** who continues as a director of the corporation, and as a member of the executive staff of **Edgar F. Kaiser,** vice president and general manager.

—o—

Robert A. Lubker has been named assistant chairman of metals research activities at Armour Research Foundation, Chicago. He became affiliated with the foundation two years ago when he assumed charge of the research operations in nonferrous metallurgy. He had previously been connected with Westinghouse Electric Corp., where he had been in charge of nonferrous metallurgical engineering at the company's East Pittsburgh works. **Walter C. Troy** has been appointed supervisor of heat treating research at the foundation. He joined the metals research department a year ago. Another appointment to the staff of Metals Research Foundation is that of **Dr. Julian Glasser,** former director of research for the General Abrasive Co. Inc., Niagara Falls, N. Y.

—o—

Vincent C. Judd, on the sales engineering staff of Bendix Aviation Radio Division, Bendix Aviation Corp., Baltimore, has been named manager of automobile radio sales, with headquarters in Detroit.

—o—

Mack V. Phillips has been appointed sales manager of the Commercial Division of Bruce Fox Wrought Metals Inc., New Albany, Ind. He formerly was an industrial engineer with E. I. du Pont de Nemours & Co. Inc.

—o—

H. D. Johnson, assistant sales manager, Hickok Electrical Instrument Co., Cleveland, has been appointed sales manager, succeeding the late **Robert Williams.**

—o—

General Electric Co., Schenectady, N. Y., announces four appointments in the recently-organized Aircraft, Federal and Marine Divisions of the apparatus department. **J. C. Wheeler** is administrative assistant to the divisions' manager and **William C. Elcan** has been appointed manager

FRANK W. SEIVERT

Appointed advertising manager of the Kellogg Division of American Brake Shoe Co., New York. Noted in STEEL, Mar. 1 issue, p. 84

Engineering News . . . AT A GLANCE

CUTS SINTERING COSTS—Consolidated Mining & Smelting Co. of Canada, Ltd., is now sintering lead concentrates at a saving in fuel consumption of 40 per cent through use of an oscillating ignition device it is reported. In operation, the burner moves back and forth across the charged grate in a plane perpendicular to the long axis of the air supply line on which it hangs from bearings about 8 feet above the grate. Short hot flame is played obliquely on the bed throughout its full width of 42 inches insuring proper and complete ignition.

STRIVES TO LOWER NITROGEN—Chicago South Works of Carnegie-Illinois Steel Corp. is now in the midst of extensive experiments on a 25-ton, side-blown bessemer converter recently purchased from J & L in Pittsburgh. Chief objective of the experiments, it is revealed, is to produce a lower nitrogen content steel closely approaching that of open-hearth. New methods in the blowing technique are being tried as one phase of the program.

BOOSTS PRODUCTION CAPACITY—In Detroit, Fabristeel Products Inc., recently added 65 per cent production capacity to its newly purchased plant in order to keep pace with orders for its Fast-On clinch nuts and attaching machines. The fasteners, created by the company and now finding wide acceptance in automotive and other production industries, increase thread areas in sheet metal, making it practical to use lighter gage stock, shorter screws, generally simplifying assembly in inaccessible places. The machines enable an operator to set as many as 2500 nuts per hour on assembly of small parts.

WIRE ROPE LUBRICATING SECRET—High viscosity of semifluid wire rope lubricants by virtue of their inertness should be applied in heated condition, it is pointed out by *Lubrication,* published by The Texas Co., New York. Merely to daub or paint a rope with such a product at normal temperatures would be relatively ineffectual. Even, though the surface might be more or less coated, possibility of penetration occurring to any extent is remote. This latter is the whole secret of effective wire rope lubrication.

SELECTIVE TIN PLATING—Selective hot dip tin plating now is simplified by use of a recently developed coating material that prevents adhesion of tin on any portion of the surface where it is applied. Material, which readily withstands a muriatic acid pickling bath used in plating operations as well as the fluxing and molten tin dip, was developed by combined efforts of a large maker of tin-plated bearings and Acheson Colloids Corp., Port Huron, Mich.

TWENTY-SIDED LAB—In the jet-black photometric Cleveland laboratory of the Westinghouse Lighting Division, a gigantic box, 10 feet high and shaped like a cut diamond is used to measure total lighting efficiency of a luminaire after candlepower readings are taken from all angles. Called an icosahedron, the box opens like an Easter egg to reveal a snow-white room with 20 flat sides. White walls provide perfect light reflection, and brightness of this reflection is measured by a small photocell located in a window at one side of the "shell."

OIL IS OIL?—Some heat treaters and metallurgists believe that insofar as quenching is concerned, "oil is oil", that the cheapest light neutral oil obtainable is the best for the purpose. While for some quenching applications an ordinary 100-second viscosity straight mineral oil is useful, critical investigations show that more specialized types of quenching oils are preferable for more critical work where high as-quenched hardness and lack of distortion are both problems. (p. 64)

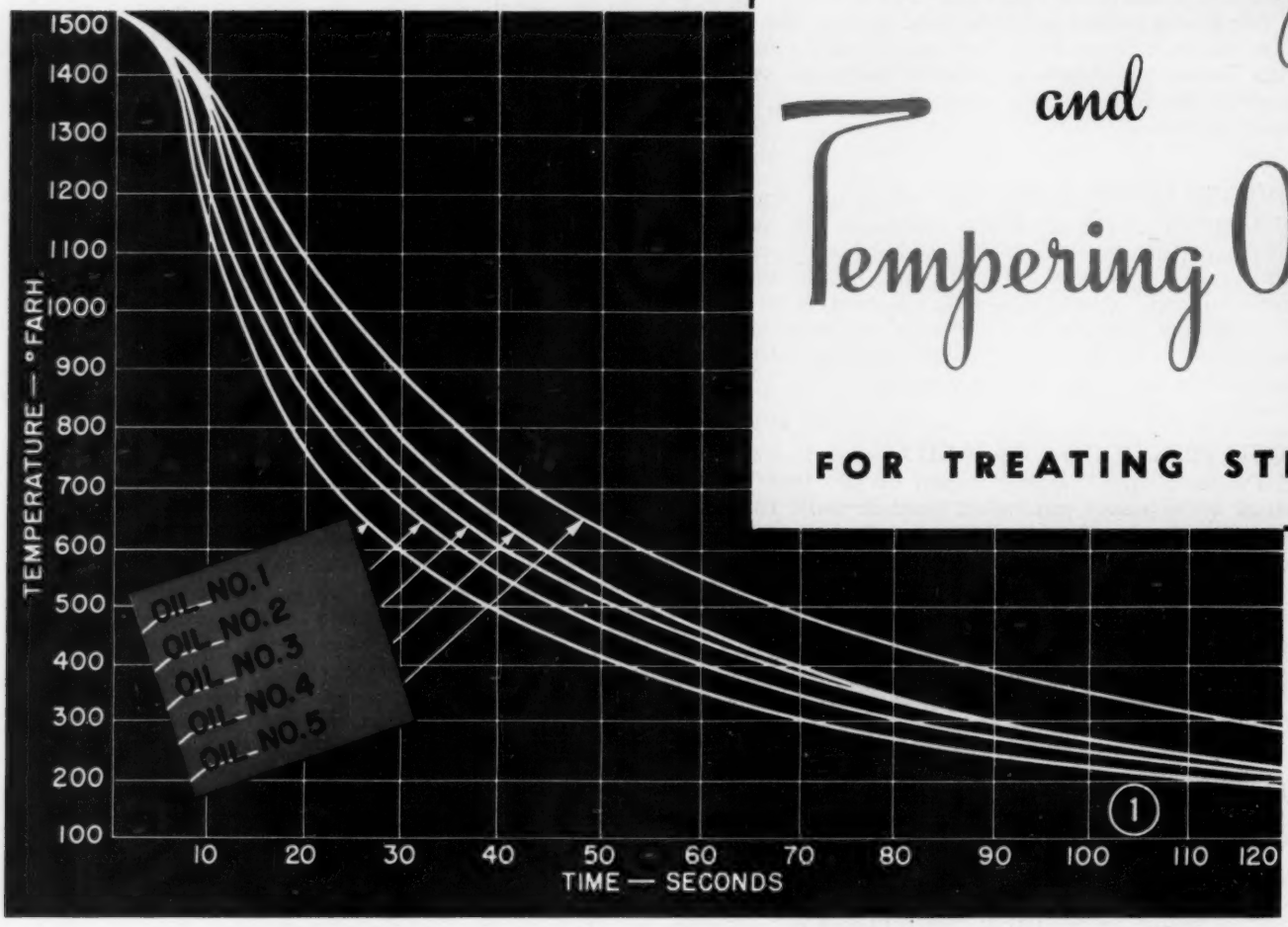
INFLUENCE OF COMPOSITION—In discussing metallurgical aspects of carbon steel spot welding, J. Heuschkel of Westinghouse Research Laboratories, points out that low carbon steel welds, as made—that is, without any form of heat treatment—are stronger than high carbon steel welds. He explains that as the carbon content is increased from very low values the tension-shear strengths for a given material thickness gradually increase for the "as welded" condition. Above a certain amount, magnitude of which varies with material thickness, further additions of carbon tend to increase brittleness to such extent that, under stress conditions involved in testing of even a single spot weld, net strength is reduced. (p. 67)

METALLURGICAL BURN—Burn color is not, in itself, objectionable in grinding operations since it is an oxide film, thickness of which is measured in millionths of an inch. It merely indicates that the ground surface and layers beneath it reached high temperatures. However, high surface temperatures and resultant stresses may lead to distortion or, in case of hardened steel, to cracking. If the material is hardenable metallurgical changes may take place. Best method to determine gravity of burn is to remove traces of burn color, etching them for 30 seconds in 5 to 10 per cent nital. (p. 71)

TWICE FILTERED AIR—Crane cab cooling system developed by Dravo Corp., Pittsburgh, removing noxious fumes as well as cooling, filters air used for ventilating both the cab and motor twice. Temperatures within the cab are held at 80° F automatically and continuously, although air surrounding the crane is 140° F. (p. 82)

Nature and function of various heat treating media, and mechanics of the quenching action are discussed in this first part of a timely two-part article. The author's conclusions are based on both established and new experimental data

HOW TO SELECT Quenching and Tempering Oils FOR TREATING STEEL



HEAT treating may be defined as a thermal means of changing the properties of metal to suit it for a particular purpose or application. The proper use of various media, such as quenching or tempering oils, represents more of a problem in steel treatment than is the case with nonferrous metals, and for that reason, this discussion is limited to ferrous metals.

Heat treating oils, depending upon type, are used for hardening such as in quenching, or in toughening processes such as in tempering. Quenching is simply the operation of rapidly reducing the temperature of a heated piece of steel to effect certain solid transformations resulting in increased hardness. Tempering is the process of reheating a quenched and hardened steel piece to a temperature below the critical temperature to reduce somewhat its hardness, and thereby to secure the additional quality of toughness.

Modern heat treating practice provides also for such processes as austempering and martempering, which are essentially hardening or quenching operations performed under conditions of elevated quench bath temperatures to secure an optimum combination of high uniform hardness and freedom from objectionable brittleness, cracking or distortion in the heat treated piece. More will be said of these processes and quenching media used in them later in this article.

Quenching Fluids—There are a number of materials which can be utilized as quenching media including air, water, brine, caustic solutions, emulsions, oils, molten salts, and even molten metals such as lead. Most commercial and industrial quenching is done in (1) air, (2) water or aqueous solutions, (3) oils and (4) molten salts. In fact, steels generally are classified as water hardening, oil hardening, or air hardening dependent upon which medium is best suited for the particular steel composition and hardness properties desired from the quench.

In the general order of decreasing severity of

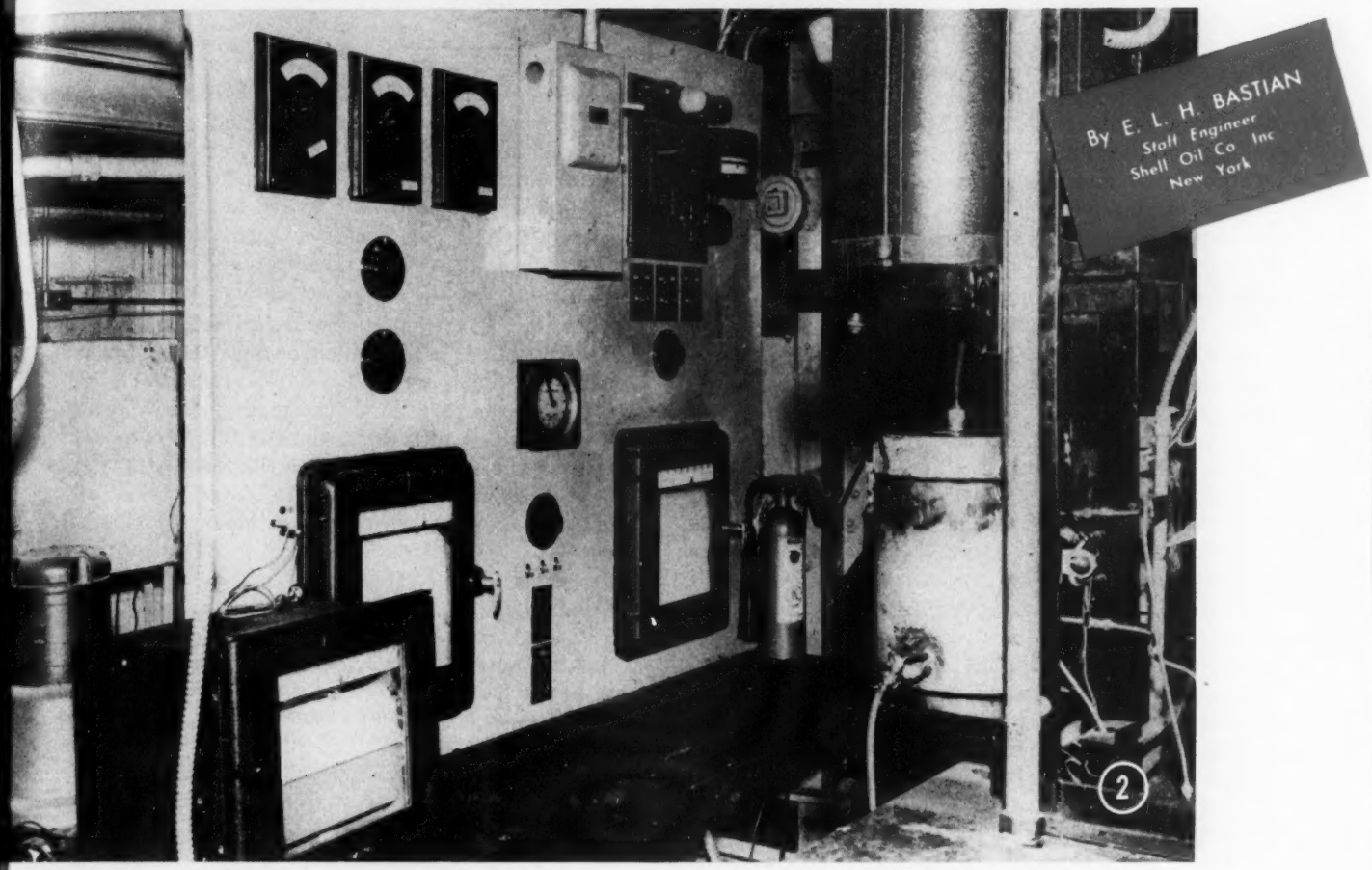


Fig. 1—Center cooling curves for several test oils. Stainless steel (25-12) specimen ¾-inch diameter by 3 inches long; bath temperature 80°F, with bath agitation

Fig. 2—Research laboratory quenching apparatus showing test control panel and temperature recording instruments

quench, these media are listed as follows: 1. Caustic soda (sodium hydroxide) solution; 2. brine (sodium chloride) solution; 3. water; 4. acid (sulphuric of hydrochloric) solution; 5. oils—petroleum or compounded oils; 6. molten salts or metals (lead); 7. air.

Water hardening is generally employed on low carbon or low alloy steels which require a relatively drastic rate of quench cooling to secure desired hardness. Oil hardening is employed for a wide range of steels where hardness and also freedom from distortion and cracking are important. Oils may also be used in various interrupted quench processes as in martempering, or for use subsequent to immersion of the steel in molten salts or metals.

The latter are generally used in interrupted quench processes on high carbon and alloy steels where intricate shape and combinations of light and heavy sections of the piece make distortion and cracking a critical problem. Acid solutions are only infrequently used as a quenching medium. They provide cooling rates between those of water and oil. Air as a quenching medium is applicable to high carbon and high alloy steels which harden readily even at slow cooling rates, and which, if quenched in a faster medium, would be subject to distortion and cracking.

Mechanics of Quenching Action—In order to understand how and why different quenching media have different cooling rates (and, therefore, different hardening effects) let us consider what happens when a heated piece of steel is immersed in a conventional manner in a quenching fluid.

It has been determined by careful laboratory observations and photographic methods that three distinct stages occur in the quenching fluid at the surface of immersed hot steel. These are designated as the the following: 1. Vapor stage—called "A" stage of cooling; 2. vapor transport or boiling stage—called the "B" stage; 3. liquid convection stage—called the "C" stage.

In the A stage (beginning immediately with immersion) the quenching medium is completely vaporized at the surface of the steel due to the high surface temperature. A thin vapor blanket, therefore, completely surrounds the quenched piece. Heat transfer from the steel into the bulk of the quenching medium is entirely by conduction and radiation through the vapor blanket, and is therefore relatively slow, since this vapor acts as a thermal insulating film.

Where water is the quench medium, the rate of heat transfer is even slower than with oil since the insulating property of the steam vapor film is somewhat greater than for oil vapor. The second or B

stage commences when the temperature of the steel surface has dropped to where the vapor film is no longer uniformly sustained. At this point the initial collapse of the film is accompanied by violent boiling of the liquid and heat transfer is effected by convection displacement of the vapor to cooler parts of the liquid medium, where condensation occurs. Cooling is very rapid in the B stage, particularly with water as a quench, since the rate of vaporization is high and rapid transfer of volumes of steam from the heated metal surface provides for quick cooling.

C stage, marked by the termination of boiling at the specimen surface, occurs when the surface temperature has been reduced to the boiling point or end of the boiling range of the quenching fluid. Below this temperature, vapor no longer forms at the steel surface which is now completely wet by the liquid. Heat transfer is effected entirely by conduction and convection in the fluid. The cooling rate in the C stage is quite slow, particularly with oil media. Since the C stage ordinarily occurs at a much higher temperature with oil than with water, the effects of oil in preventing distortion and cracking are more favorable. The high rate of cooling of water down to a low initial C stage temperature, on the other hand, tends to promote residual stresses in the quenched piece resulting in objectionable strains and breakage.

It will be seen from the above discussion of the A, B, and C stages of cooling that for optimum quenching results—that is, high hardness and freedom from brittleness, distortion, and cracking—that a quenching fluid should possess characteristics resulting in a short A stage of cooling and as long a B stage as possible, but to end at sufficiently high temperature to prevent too rapid cooling in the lower temperature or hardening range where stresses may result in dimensional instability and strain.

Where the conventional full quench is employed, the quenching medium must possess these properties as an inherent part of its characteristics. The alternate is to employ an interrupted quench procedure wherein a fast quench medium is followed in use by a slower medium for cooling in the lower temperature range.

Water and Aqueous (*Please turn to Page* 86)

Fig. 3—Three automatic quenching units used to secure both cooling curves and interval quench efficiency ratings for various experimental and commercial quenching media. Essentially each unit consists of a quench bath contained in a calorimeter, above which is mounted an electric heating furnace. The quench bath is equiped with an electric stirrer

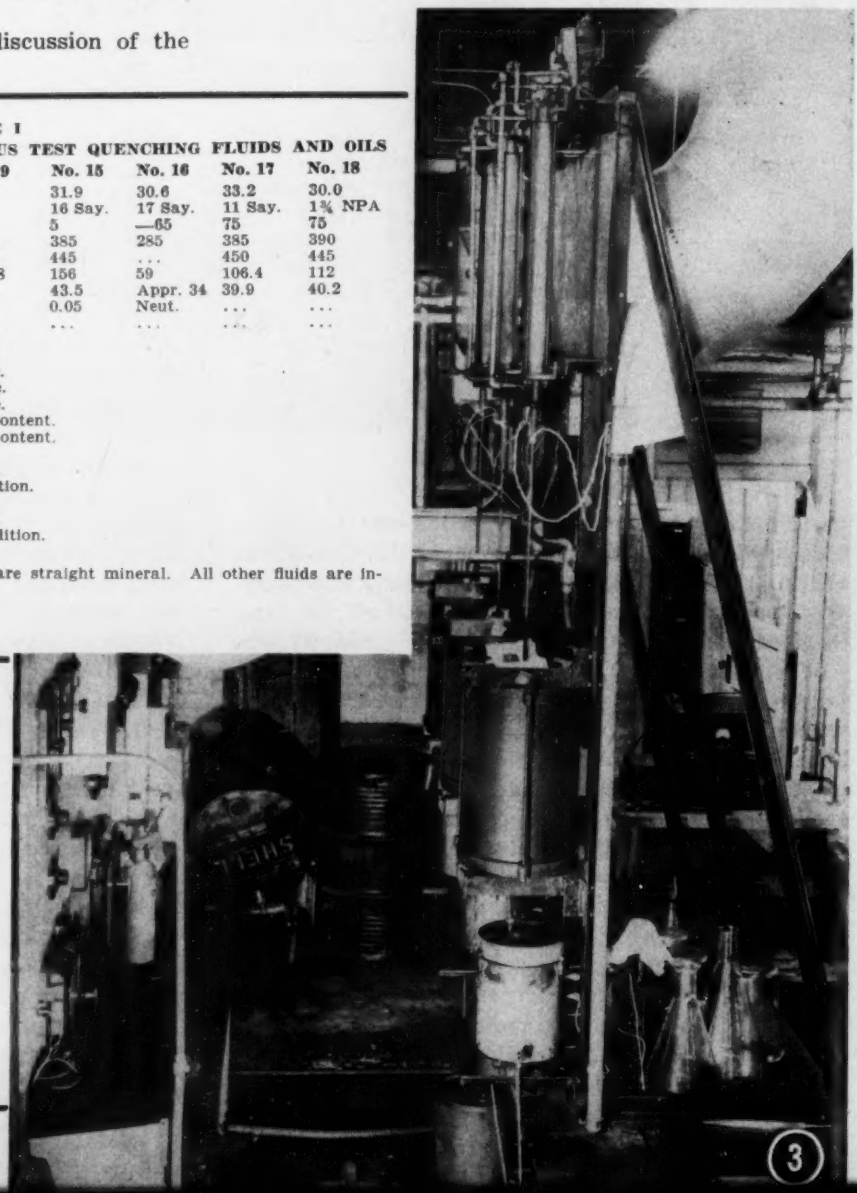


TABLE I

PROPERTIES AND DESCRIPTION OF VARIOUS TEST QUENCHING FLUIDS AND OILS

Typical Properties	No. 1	No. 5	No. 9	No. 15	No. 16	No. 17	No. 18
Gravity, ° API	30.4	33.4	29.7	31.9	30.6	33.2	30.0
Color	3½ NPA	...	...	16 Say.	17 Say.	11 Say.	1¾ NPA
Pour, ° F.	5	5	0	5	—65	75	75
Flash, ° F.	380	395	460	385	285	385	390
Fire, ° F.	445	460	525	445	...	450	445
S.U. Vis. @ 100° F. ..	136	106.4	255.8	156	59	106.4	112
S.U. Vis. @ 210° F. ..	42.6	40.3	50.1	43.5	Appr. 34	39.9	40.2
Acid Number	Lt. 0.05	...	...	0.05	Neut.	...	...
Rams. Carbon, % w. .	0.58	0.10	0.10	...	...	...	...

No. 2—Commercial Quenching Oil—Premium Grade.
No. 3—Commercial Quenching Oil—Premium Grade.
No. 4—Commercial Quenching Oil—Premium Grade.
No. 6—Same as Oil No. 1 except reduced additive content.
No. 7—Same as Oil No. 6 except reduced additive content.
No. 8—Commercial Quenching Oil.
No. 10—Same as Oil No. 5 plus petroleum addition.
No. 11—Same as Oil No. 10 except reduced % addition.
No. 12—Same as Oil No. 5 plus Degras.
No. 13—Same as Oil No. 5 plus petroleum addition.
No. 14—Same as Oil No. 13 except increased % addition.
No. 19—Castor Oil.

Note: Oils Nos. 5, 9, 10, 11, 13, 14, 17, and 18 are straight mineral. All other fluids are inhibited, compounded or non-petroleum type.

TABLE II

INTERVAL QUENCH EFFICIENCY (PER CENT) FOR SOME FLUIDS TESTED

* Quench Medium	Efficiency At 8 Seconds	Efficiency At 12 Seconds
Quenching Oil No. 1 ...	50.0%	62.3%
Quenching Oil No. 2 ...	46.9	54.3
Quenching Oil No. 3 ...	24.2	34.5
Quenching Oil No. 4 ...	32.3	47.9
Quenching Oil No. 5 ...	24.7	36.6
Quenching Oil No. 6 ...	45.4	57.6
Quenching Oil No. 7 ...	31.8	45.9
Quenching Oil No. 8 ...	37.2	51.5
Quenching Oil No. 9 ...	31.7	45.5
Quenching Oil No. 10 ..	41.9	53.2
Quenching Oil No. 11 ..	32.0	47.6
Quenching Oil No. 12 ..	31.1	45.1
Quenching Oil No. 13 ..	35.6	51.1
Quenching Oil No. 14 ..	34.0	54.5
Quenching Oil No. 15 ..	29.0	39.6
Quenching Oil No. 16 ..	20.2	31.8
Quenching Oil No. 17 ..	20.7	31.5
Quenching Oil No. 18 ..	20.5	30.2
Quenching Oil No. 19 ..	43.2	52.3

* See Table I for description and properties.

METALLURGICAL ASPECTS OF

Carbon Steel Spot Welding

By J. HEUSCHKEL
Westinghouse Research Laboratories
East Pittsburgh, Pa.

Stress concentrations from loading conditions, influence of compositions, heat treatment, prewelded tensile properties and other data are presented in this second and concluding part of the article

HAVING established that the quench for the thinner, and more commonly spot welded, sheet thicknesses was in excess of the critical rate for all compositions, and that the higher carbon steels commonly contained cracks at the weld periphery, standard physical tests were made to determine how the mechanical characteristics of the welds varied with carbon content, temper and thickness.

When the weld is loaded in direct-tension, the interfaces of the members are actually subjected to superimposed concentrated bending stresses parallel to the surface of the member, and a complex concentrated principle stress of high order is thus applied to the interface periphery of the weld ingot. When the ends of the cross members are tightly clamped to the test jigs the loading conditions are approximately those of a fixed ended beam.

Bending moments at the weld edge are about one-half that which occur when the ends are free and the loading conditions are those of a simply supported beam. This is a factor to be considered in the application of the data since a weld loaded in bending from one side only, as could occur in a structure under certain design conditions, could not be expected to develop the same maximum loads as reported herein where the strengths were obtained by loading both sides of the weld diameter.

Influence of Composition—Low carbon steel welds as made, that is, without any form of heat treatment, are stronger than high carbon steel welds for both types of loading because they were neither cracked nor brittle. As the carbon content is increased from

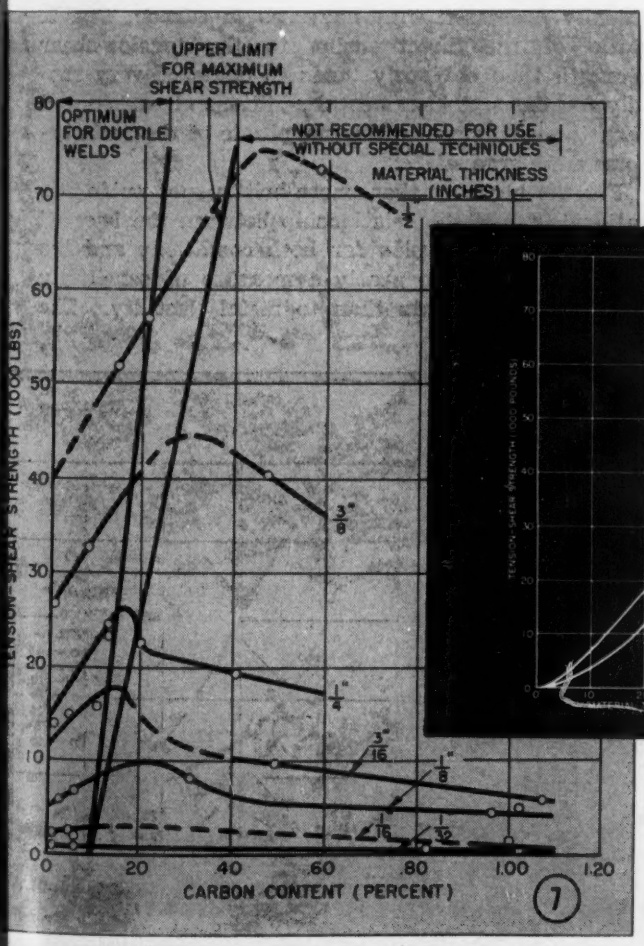

UPPER LIMIT FOR MAXIMUM SHEAR STRENGTH
OPTIMUM FOR DUCTILE WELDS
NOT RECOMMENDED FOR USE WITHOUT SPECIAL TECHNIQUES
MATERIAL THICKNESS (INCHES)
TENSION-SHEAR STRENGTH (1000 LBS)
CARBON CONTENT (PERCENT)
7

Fig. 7—Obtained relations between carbon content, shear strength and material thickness of plain carbon steel, hot rolled

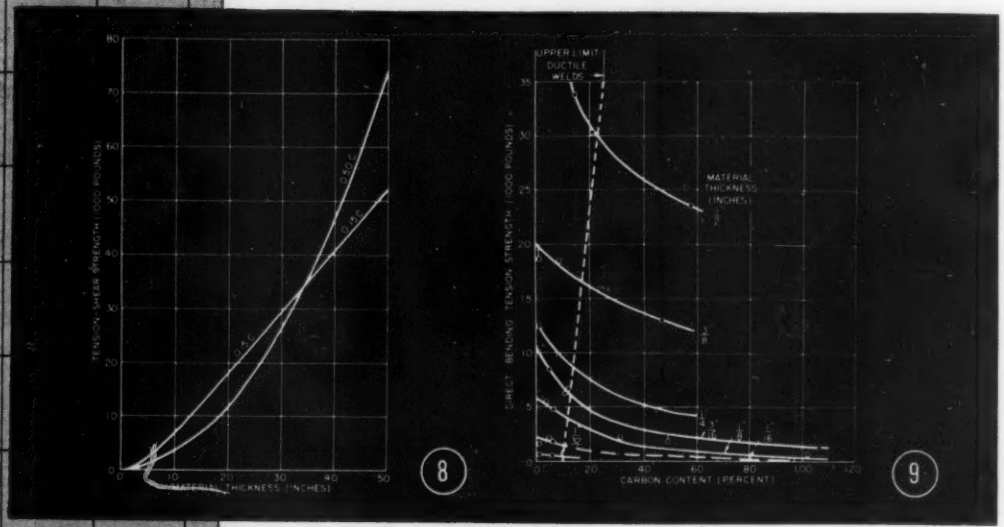


Fig. 8—Influence of material thickness upon tension-shear strength for fixed carbon content. Preannealed or hot rolled stock

Fig. 9—Obtained relation between carbon content, direct tension strength and material thickness. Preannealed or hot rolled condition

very low values the tension-shear strengths for a given material thickness gradually increase, as illustrated in Fig. 7 for the "as welded" condition. All points in that figure are actual test values, each point being the average of five specimens.

Above a certain amount, the magnitude of which varies with the material thickness, further additions of carbon tend to increase the brittleness to such an extent that, under the stress conditions involved in the testing of even a single spot weld, the net strength is reduced. This is the consequence of the inability of the heat affected and weld edge zones to withstand the accompanying deformation. This relationship was present for all thicknesses of hot rolled or preannealed stock. The presence of edge cracks in the higher carbon steels further accelerates the downward strength trend.

When cross curves were plotted from the data in Fig. 7 for each percentage point increment of carbon content, as illustrated in Fig. 8 for 0.15 and 0.50 per cent carbon, it was found that the tension-shear strength always varied approximately in a parabolical relationship with respect to material thickness.

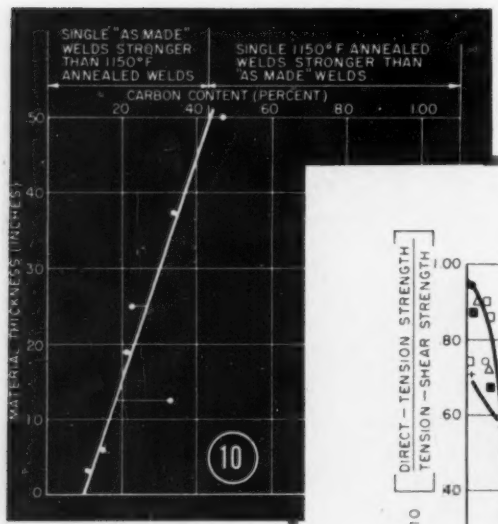
There is a tendency for the lower carbon, lower hardness, steel welds to be less strong than the higher carbon steel welds in the greater thicknesses while the reverse relationship exists for the thinner sheets where the high carbon steel welds are extremely brittle.

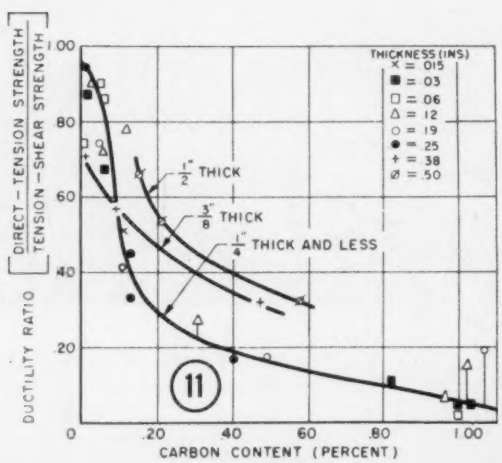
In general, the welds were more consistent within each carbon content group for the thinner sheets than for the thicker materials. Also the low carbon steel welds were more consistent than those made in the higher carbon steels. The use of a post-welding furnace treatment improved the consistency slightly for the lower carbon steel welds and more substantially for the higher carbon steel welds, even though the second group contained cracks. These excellent group consistencies were obtained for each composition while, as shown in Fig. 7, variations of more than 50 per cent were being obtained for each material thickness as the carbon was increased from a minimum to the optimum amount while using the same welding setup. This is an important factor to be considered when attempting to evaluate the consistency of a series of welds without knowledge of the uniformity of the materials being welded.

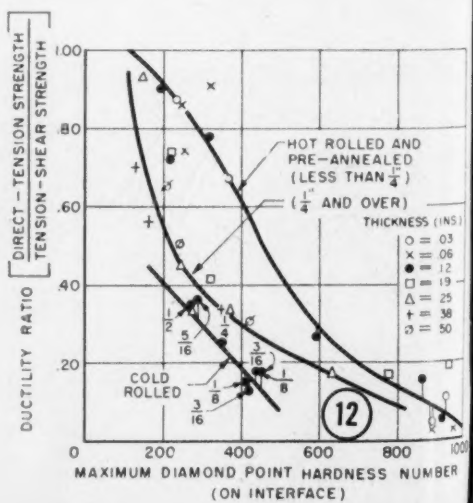
It is an elementary fact that steel for a given treatment, increases in tensile strength with increases in carbon content. It was shown in Fig. 7 that the spot weld tension-shear strength first increased and then decreased in strength with increases in carbon content. If the ultimate strength of the steels involved be roughly estimated from their prewelded hardnesses, and the width of strip for which the weld in tension-shear will develop the full tensile strength be determined by calculation, it is apparent that while in the thinner low carbon steels the weld will develop the full strength of a strip of several weld diameters, such a strip width for the high carbon steel welds would be less than one diameter. The full strength of the higher carbon steel sheets cannot be secured without the use of special techniques or the employment of many more welds or both. More accurate prewelded material strength data were not required to illustrate this point.

Ratio of the direct-tension strength to that of the tension-shear strength of the same series of welds is commonly used as a criterion of spot weld ductility. It was shown that the tension-shear strength first increased and then decreased with increases in carbon content, Fig. 7, while the direct-tension strength continually decreased with increases in carbon, Fig. 9. Ratio of the direct-tension to the tension-shear strength thus obviously tends to decrease very rapidly for the first incremental additions of carbon and then the reductions in the magnitude of the ratio become more gradual.

For the higher carbon, more brittle spot welds this ratio is in fact the relationship between the lowered strengths of the welds for both conditions and the ratio becomes more nearly a measure of sensitivity to stress components than to metal ductility. The







obtained ratios plotted against carbon content, are shown in Fig. 11 for all thicknesses of hot rolled steel. For the ¼ inch thicknesses, and less, all points lie approximately on the same curve. For a given carbon content higher values of the ratio were obtained for the thicknesses over one-fourth inch except for the very low carbon steels.

Four principles are illustrated by plotting the ductility ratios against maximum obtained hardness as shown in Fig. 12 for "as made" welds: In general, the higher the hardness at the weld edge the lower will be the ductility. Conversely, for lesser weld edge hardnesses higher ductility ratios are obtained. The variations in hardness shown for a given thickness are actually the result of carbon variations.

For a given hardness at the weld edge the thicker more rigid specimens have lesser abilities to withstand deformation, probably at least partially because of higher point stress concentrations. A thin member cannot develop as high a differential bending stress with the low order of deflection that is involved.

For a given hardness at the weld edge the elastically and plastically stronger cold rolled steels have lesser abilities to withstand deformation, when loaded under the notched conditions of the direct tension test.

Weld edge hardness alone cannot be used as a sole criterion of weld performance. For a known composition however, hardness is a useful tool in providing an understanding with respect to the thermal history of the weld and of the surrounding metal.

Allowing somewhat for minor discrepancies in the data the over-all indication is that by accepting a ductility ratio of 50 per cent as a suitable lower limit for a ductile weld classification the upper limit for carbon which will provide such a value in the "as welded" condition can be defined as being, for hot rolled or preannealed materials:

Equation (1) ..... $C_{max} = 0.10 + 0.3t$

where C = carbon content in per cent, and
t = single thicknesses of material in inches.

Fig. 10—Relation between carbon content, material thickness and unity ratio for welds in tension-shear. Hot rolled or preannealed stock only

Fig. 11—Influence of carbon content upon ductility ratio. Hot rolled or preannealed

Fig. 12 — Relation between maximum hardness and ductility ratio

If a lower ductility ratio of 40 per cent could be accepted the upper carbon content may be described as

Equation (2) ..... $C_{max} = 0.10 + 0.6t$

Location of these upper limits with respect to the shear and direct tension strengths were shown on the families of curves in Figs. 7 and 9. Use of the upper analyses-thickness relationship in equation 1 for hot rolled or preannealed steel can be recommended without qualification. Use of the limit in equation 2 places the upper composition level welds close to the danger zones of cracking, excessive hardness, increasing of brittleness and also decreasing of strength.

Considering the opposing tendencies of carbon upon the strengths of the welds loaded in the two directions it is probable that the use of the upper limit permitted by equation 1 may also be the most suitable practical composition, since it is close to the most economical one for welds loaded in shear, as they should usually be loaded.

By such selection and control of carbon contents the same weld strength can be obtained from thinner sheets, which are more economically welded than thicker sheets. Since total weld strength and not the total strength of the unwelded section is generally the important structural factor, once sufficient rigidity has been assured the intelligent use of optimum compositions is believed to be an important engineering matter.

The use of a 0.10 per cent maximum carbon content for the thin sheets may appear to be a serious welding restriction to fabricators familiar only with the structural steels. Actually this is not the case. A recent survey of steel manufacturing practices has shown that while applicable specifications permit up to and including 0.15 per cent carbon almost all thin sheet tonnage is being furnished to a 0.10 per cent maximum carbon content for production reasons whether the materials are to be used for spot welding or not; with the exception of such specialties as spring steels.

Influence of Heat Treatment—All specimens were air cooled to room temperature after removal from the welder and an appropriate number were furnace heated and recooled as previously described. All specimens were carefully handled during the transfer period to the furnaces. This was important because in the "as welded" condition the high carbon steel welds were so brittle that dropping a specimen freely upon a concrete floor from a height of 60 inches, would ordinarily result in complete rupture of the specimen.

There is a production difference between postwelding furnace heat treatment and in-the-machine heat treatment of the medium and high carbon steel welds, with all of the quality advantages in favor of the second method. Untreated high carbon steel welds may be sufficiently brittle so that rupture will occur as the result of shop handling, or as a consequence of structural cooling stresses before the assembly could be placed in the furnace.

Specific influence of postwelding heat treatments of the entire specimen upon the hardness, metallographic structure and the (*Please turn to Page* 104)

Seen and Heard in the

Machinery Field

By GUY HUBBARD
Machine Tool Editor

LONG WAY FROM ELI WHITNEY: I am taking time out from the sixth and biggest tool show staged by the American Society of Tool Engineers, to rest my feet and to do a bit of soliloquizing on the significance of this Industrial Exposition at Cleveland's Public Auditorium.

About 150 years ago, when the then small United States was an island of democracy in a world of aggressive autocracy, Thomas Jefferson encouraged the inventor of the cotton gin to turn his talents to the manufacture of army rifles, "each part of which would be as exactly like each corresponding part, as are the successive impressions from a copper plate engraving".

It is apparent that Eli Whitney originally had in mind some method of precision forging or stamping of gun parts to such accuracy that little or no subsequent fitting would be necessary. That was a brilliant idea, but it was far ahead of its time in that the machines, the die steels, the technique of die sinking and the understanding of plastic forming of metals required the concentration of many minds over many years before that idea even could be approached.

As it was, Eli Whitney did become the founding father of the machine tool industry in the United States and he did develop the technique of jigs, fixtures and special tooling—thereby becoming the founding father of tool engineering. Through the combination of those two achievements, he laid the foundations of interchangeable manufacturing—first of guns and eventually of all manner of capital and consumer goods.

There is ample reason to believe that if Eli Whitney had not accomplished what he did when he did, the colonial economy and the agricultural economy of our country would have kept the United States so small and so weak that some European power or group of powers could have seized and "sunk" our island of democracy. As it was, this country became strong and powerful at such a rapid rate that such aggression effectively was discouraged. Interchangeable goods, rather than interchangeable guns, in the main brought about that happy result.

The big tool show comes at a time when again the United States is the mainstay of democracy in a troubled world. Although, as usual, the emphasis is on tools, machines, and methods for the economical mass production of more and better things for more people, it is not hard to see that these same 1948 versions of Eli Whitney's manufacturing means and manufacturing methods give us—for the time being at least—an edge on the rest of the world as far as national defense is concerned. It is too bad that we must think that way about the show, but world conditions force us to do so.

Under such conditions it is up to us to do some very serious thinking along those lines. The ASTE Show should serve to impress all of us that our first line of defense is based on American machine tool building and tool engineering, and that now is no time to allow these closely related activities to "slip" in any way, shape or manner.

RESEARCH IN ACTION: On March 3, I attended the Railroad Executives' Conference in Schenectady as guest of General Electric Co. and the American Locomotive Co., who long have been collaborators in designing and building railway motive power units. There I learned an impressive lesson in the importance of scientific research in modern industry. In this "high pressure world" of high speed mechanisms, rule-of-thumb engineering is "out"—and that certainly goes for gas turbine design.

One of the main features of the conference was a working demonstration at the plant of General Electric Co. of the 4800 hp gas turbine developed by that company for eventual railroad locomotive use.

Standing in front of this 19 foot, 20,000 pound machine as it was reved up to starting speed, fired and then brought up to 6700 revolutions per minute at 3500 kilowatts load, it was comforting to remember the thoroughgoing high temperature, high tensile laboratory tests on turbine components which I had just witnessed. Also, it was comforting to note the elaborate instrumentation which literally was keeping tabs on every inch of the huge prime mover as it roared into action.

When metal parts revolve at 6700 revolutions per minute and are subjected to temperatures of 1400 degrees in that process, it behooves the designers and builders of the mechanism to know ahead of time exactly how those parts are going to behave in service so that nothing will be left to chance.

Not in many a long day have I seen any such array of scientific testing equipment of unusual and practical nature, as I saw at GE. Test bars were being "pulled" in furnaces, and every stage of elongation and final failure "graphed". Replicas of turbine blades were being given "life" tests at 1400 degrees while being vibrated by powerful magnets.

Disks such as those holding the blades were being revolved at high speed in furnaces and their stretch and balance were being watched and recorded with infinite care. Those are but a few of the long series of steps which guided the metallurgists and designers in the building of the operating machine.

That is why it operates efficiently and safely on the test stand. That is why it will be sooner than generally is realized, that it will be operating on the rails. Only in organizations such as those of GE and Alco are such things possible. The "attic genius" doesn't fit this modern picture.

How to Cut Unnecessary Costs . . .

To avoid the exasperating and costly necessity of rejecting ground parts because of cracks, stresses or burn, cost-minded manufacturers must be able to detect and recognize injuries; decide whether or not the trouble is serious enough to affect useful life of the part; and track down and eliminate the principal cause or causes of defects so that parts can be produced economically

(1) Injuries in Ground Surfaces

By L. P. TARASOV
Research Laboratories
Norton Co.
Worcester, Mass.

ANYONE who has had much to do with the grinding of hard steel has undoubtedly had the sad experience of finding, at one time or another, that the ground surface was cracked and that, as a result, the finished piece could not pass inspection. Among the operations in which this difficulty may be encountered are tool, surface, gear, and thread grinding; among the materials, tool steels, carburized steels, and cemented carbides.

In many instances, such cracking can be eliminated without too much trouble by decreasing the severity of grinding, as by changing to a softer wheel or by feeding less rapidly, to mention two of the most common recommendations. In an appreciable fraction of the cases, however, the improvement in the grinding conditions that is practicable under the circumstances is not sufficient to eliminate surface cracking and it becomes necessary to do something about the metallurgical condition of the steel.

Burn is another phenomenon encountered from time to time in grinding. A moderate amount of burn in hardened steel may be accompanied by soft skin, while a more severe burn may involve rehardening of the surface, leaving it brittle. In either case, the burned surface may wear more rapidly than expected.

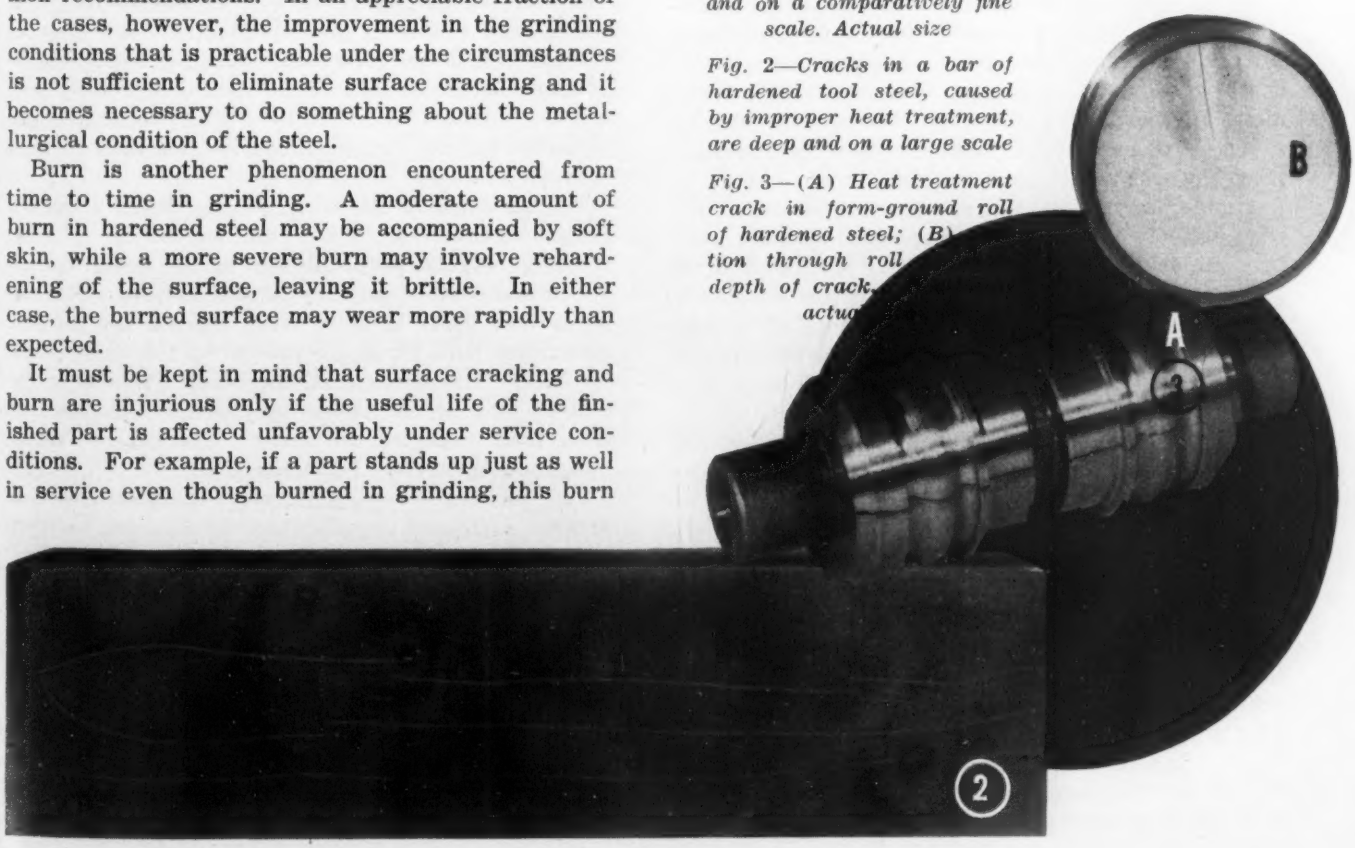
It must be kept in mind that surface cracking and burn are injurious only if the useful life of the finished part is affected unfavorably under service conditions. For example, if a part stands up just as well in service even though burned in grinding, this burn is harmless and it would be wasting money to eliminate it by reducing the production rate. Even surface cracks are occasionally found to be harmless from a practical standpoint. However, to be on the safe side, it is best to assume that cracks and burn are to be avoided unless there is evidence in the form of past experience or test results that they do not affect the service life of the part in question.

Nature and Detection of Injury—The form of injury that can be the most serious is cracking. This is because cracks are regions of weakness which tend to grow larger when the parts are subjected to high forces in actual service, as is so often true of ground

Fig. 1—Cracks in another bar of hardened tool steel, caused by too severe a grinding operation, are shallow and on a comparatively fine scale. Actual size

Fig. 2—Cracks in a bar of hardened tool steel, caused by improper heat treatment, are deep and on a large scale

Fig. 3—(A) Heat treatment crack in form-ground roll of hardened steel; (B) tion through roll depth of crack, actu



parts. Since cracks are not likely to stop growing, a cracked piece is apt to fail prematurely, sometimes with disastrous consequences.

It is vital to distinguish between heat treatment cracks, which may be present in the workpiece prior to grinding (even though they happen to be overlooked until grinding has cleaned up the surface and made them easy to see), and the surface cracks that occur either during or after grinding. A typical example of each is shown in Figs. 1 and 2. The outstanding difference between the two types is that cracks occurring before grinding are usually deep and on a large scale while those associated with the grinding operation are shallow and on a fine scale, and besides have a definite sort of a relationship to the grain marks left by the wheel.

Although the latter are often called grinding cracks or grinding checks, these terms tend to be misleading. In hardened steel, faulty heat treatment can make the work so sensitive to grinding that even a gentle grinding operation will result in the surface becoming cracked. However, there is nothing in the appearance of these cracks to distinguish them from those occurring when grinding alone is to blame.

In planning a course of action to eliminate surface cracks, it is necessary to be able to determine where the blame lies, whether it is in heat treatment alone, in grinding alone, or in some combination of the two. Only by locating the real source of the trouble can the cracks be eliminated in the most economical fashion.

Detecting Cracks in Hardened Steel—Cracks in a ground steel surface may be pronounced enough to be easily visible directly. Frequently, however, they are too fine to be distinguished so readily, or else they are covered over by flowed metal. Other methods are then required to reveal them with assurance.

Most satisfactory of these is magnetic particle inspection, exemplified by the well-known Magnaflux method. The finest cracks are readily shown up by a deposit of microscopic magnetic particles when the piece has been properly magnetized.

Another way of bringing out cracks that are otherwise difficult or impossible to see is to etch the steel in nitric acid at room temperature. A short etch, of a few seconds' duration, will not widen the cracks appreciably, but when the surface is washed off in running water and wiped dry, the acid remaining in the cracks may seep out and discolor the surface at their borders, making it easy to detect the cracks. If the etch is prolonged sufficiently and the acid is strong enough, the sides of the cracks will be eaten away by the acid and the cracks will be wide enough to be directly visible.

Hot hydrochloric acid has been used in the past for detecting cracks in ground surfaces of hardened steel, but this acid, as well as hot or cold sulphuric acid, should not be used for this purpose because the results may be ambiguous and easily misinterpreted. The trouble with these acids is that they not only widen cracks already present in a ground surface of hardened steel, and thus make them readily visible, but they are also capable of creating entirely new cracks if the surface is highly stressed in tension, as it may be from severe grinding.

Typical Crack Patterns — Principal distinguishing characteristics of heat treatment cracks are that they are fairly large and deep, and bear no relationship to the grain marks left by the grinding wheel; on the other hand, cracks formed during or after grinding are small and shallow, and are definitely related to the pattern of grinding scratches. It should be kept in mind that the latter cracks are not necessarily the result of faulty grinding since improper heat treatment may stress a piece of hardened steel so much (without actually cracking it) that even a very gentle grinding operation will then crack the surface. It is impossible to tell from the appearance or the pattern of the cracks that develop during or after grinding whether they are due primarily to improper heat treatment, or to improper grinding, or to a combination of the two.

One example of a heat treatment crack is illustrated in Fig. 3. The crack is very deep and extends horizontally along most of the hardened roll, which was form ground after the bar had cracked in heat treatment. The perpendicular relationship between most of the crack and the grinding scratches is accidental; normally, the two directions are not at all related.

Turning now to cracks associated with the grinding operation, their chief characteristic is that they are very shallow, generally less than 0.020-inch deep. In flat surfaces, they are primarily perpendicular to the grain marks, as in Fig. 1. Another typical example is the plug gage in Fig. 4, where the grain marks (not visible in the reproduction) are circular and the cracks are all radial. When grinding conditions are severe enough or the steel is extremely sensitive, additional cracks may appear to join those perpendicular to the grain marks and thus form a network of cracks.

The situation is more complicated when a curved surface is involved. Cracks formed during or after grinding may be perpendicular to the grain marks, but in many cases they are parallel instead. The latter is very likely to occur when threads are ground. Sometimes both types are present in the same piece, one more pronounced than the other. Whatever the pattern may be, the cracks may deviate considerably from their expected directions. The general trend, however, can usually be recognized.

Still another type of cracking sometimes found in ground surfaces, primarily where contact between wheel and work has been broad, is known as spalling. This condition is illustrated in Fig. 15. The cracks are shallow, not more than about 0.007-inch deep, but some of them turn parallel to the surface, join other cracks, and cause pieces to spall out. Such cracks are also found occasionally in ground gear teeth.

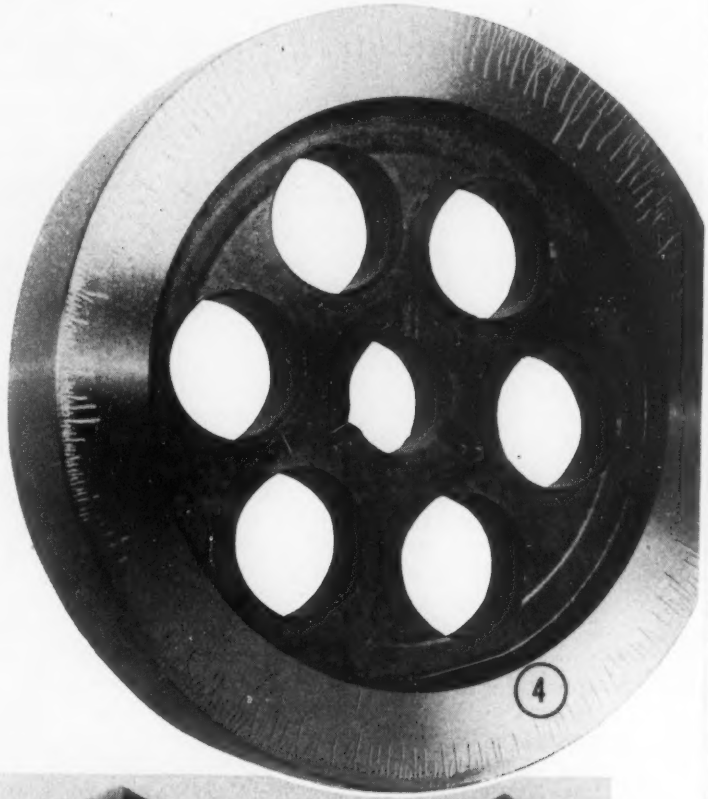
Cracks in Cemented Carbides — When cracks are present in the ground surfaces of cemented carbides,

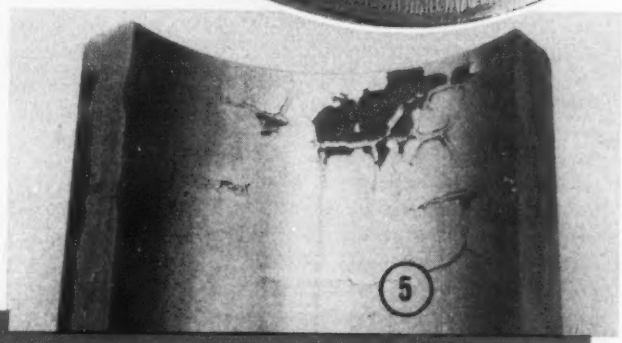
they may be very fine and even more difficult to see than in hardened steel. Unfortunately, magnetic particle inspection, which works so well with steel, cannot ordinarily be used to detect cracks in cemented carbides.

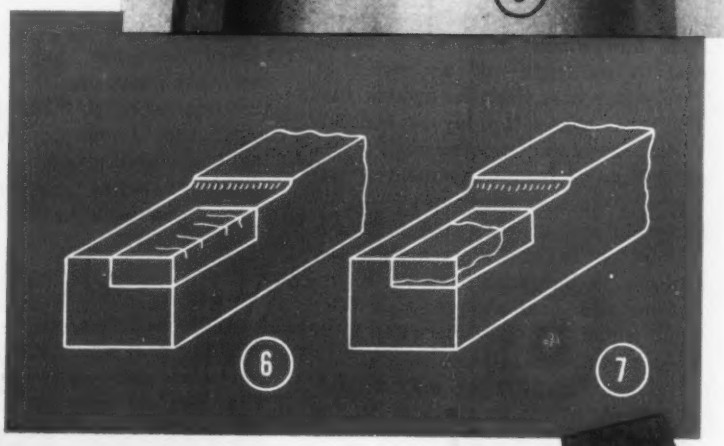
Most sensitive nondestructive method is one in which a fluorescent oil or other penetrant is permitted to soak into the surface cracks, after which the surface is cleaned off and the liquid in the cracks seeps out gradually. When the surface is examined under ultraviolet light (so-called black light), the seepage, which is concentrated near the cracks, fluoresces brightly and the cracks show up as white lines against a dark background. For simplicity, only the basic details have been presented here. The equipment for this method is marketed by Magnaflux Corp., Chicago, under the trade name of Zyglo.

Although the fluorescent penetrant method is satisfactory from the point of sensitivity, it is considered by some users of cemented carbides to be too time-consuming for routine inspection purposes. They have found that examination of the ground surfaces with a magnifying glass or a low-power microscope is all that is necessary from a practical standpoint.

When cracks are found after grinding cemented carbide tools, the source of the difficulty can often be determined from the nature of the cracking. If







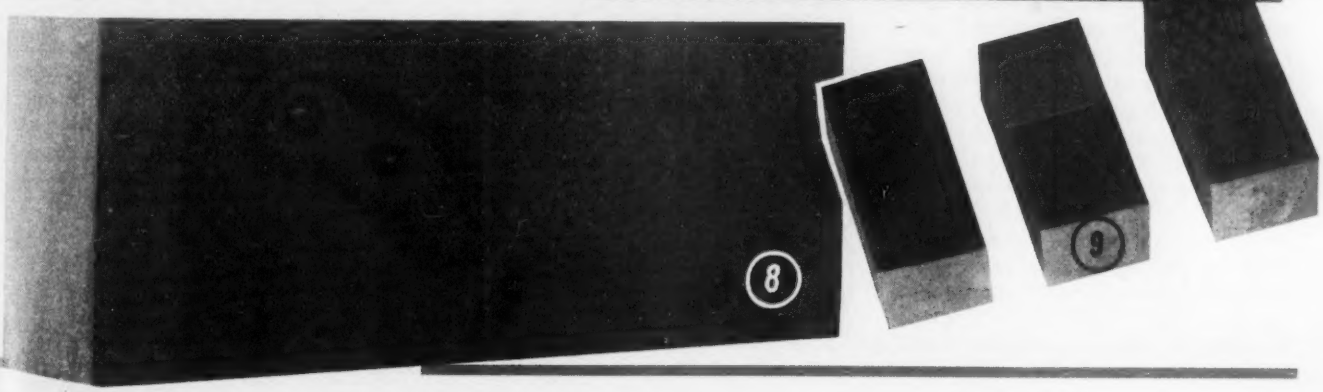


Fig. 4—Surface cracks in plug gage, resulting from too severe a grinding operation. Cracks made visible by wet magnetic particle method

Fig. 5—Spalling of carburized and hardened steel, caused by too hard an internal grinding wheel. Two-thirds actual size

Fig. 6—Typical surface cracks in a brazed cemented carbide insert caused by grinding too severely

Fig. 7—Typical crack appearing during grinding of brazed cemented carbide insert; this was caused primarily by the highly stressed condition in which the insert was left after the brazing operation

Fig. 8—Burn marks in hardened high speed steel, caused by too hard a wheel which chattered badly. One-half actual size

Fig. 9—Samples of hardened tool steel ground so severely that portions of the surface were rehardened. When the piece on the right was etched in nital, the hardened areas remained white, while the surrounding soft areas turned dark

Injuries in Ground Surfaces

only extremely fine surface cracks are present, as in Fig. 6, they are caused entirely by too severe a grinding operation.

Easily visible cracks that start near the brazed joint, as in Fig. 7, may be due to very high stresses left after the brazing operation, the additional grinding stresses being enough to cause cracking. They may also be due to rapid localized heating of the steel shank when it is ground without making contact with the carbide, in which case excessive stresses that result in cracking are set up by the considerable difference in thermal expansion of the steel and cemented carbide.

Burn — Anyone who has ever ground steel is familiar with the appearance of burn. An example is shown in Fig. 8. The visible discoloration is caused by an extremely thin film of oxide formed during momentary exposure to high temperatures. The same oxide films can be formed by tempering steel at much lower temperatures for an hour or so, and in this case we have the well-known temper colors. The essential difference between burn and temper colors is the temperatures at which they are produced.

Except from the standpoint of appearance, burn color would not, of itself, be objectionable since it is an oxide film whose thickness is measured in millionths of an inch. It merely indicates that the ground surface, and hence the layers beneath it, reached high temperatures. However, high surface temperatures and the resultant stresses may lead to distortion or, in the case of hardened steel, to cracking; and if the material is hardenable steel, important metallurgical changes may take place, which, for convenience, will be called metallurgical burn.

The heat of grinding may temper hard steel, either in spots or in the whole surface layer, the result being known as soft skin. This, of course, is generally recognized to be harmful to the cutting edges of tools. When even higher temperatures are reached momentarily, the steel surface may harden if it was previously in the annealed condition, or it may reharden if it was already hard to begin with. A hard surface developed by cutting-off may cause tool breakage when it is machined. A hardened steel rehardened by grinding will be in an unusually brittle conditon because the rehardened

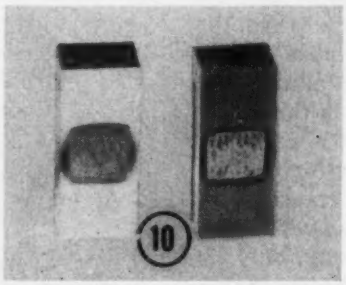


Fig. 10—Samples of hardened tool steel burned badly by plunging wheel into work on a surface grinder. Piece on the left shows the original visible burn. A similar burn mark was ground out gently in the piece on the right, which was then etched to bring out the rehardened (white) area surrounded by a softened (dark) boundary

areas of the piece are not tempered.

It is for all these reasons that burn color is commonly looked upon as a danger signal. Although all traces of visible burn are often cleaned off in the final grinding passes, it should always be kept in mind that the undesirable consequences of momentary high temperatures remain.

Hardened steel that has not been tempered remains light in color when etched in nital; tempered steel, on the other hand, darkens when etched, the degree of darkening increasing with the tempering temperature. Hardened and ground steel is likely to be in a tempered condition, and it will etch a light or medium gray.

Areas softened by severe grinding will etch darker than the portions of the surface not affected. Thus it is possible to bring out the effects of grinding heat when all traces of visible burn color have been removed. The simplest way of doing this in the majority of steels is to etch for perhaps 30 seconds in 5 or 10 per cent nital. The contrast between tempered spots and the rest of the steel is only moderate but is generally satisfactory. Highly alloyed tool steels, such as high-speed steel, may have to be etched for several minutes in a 10 per cent solution of nitric acid in water.

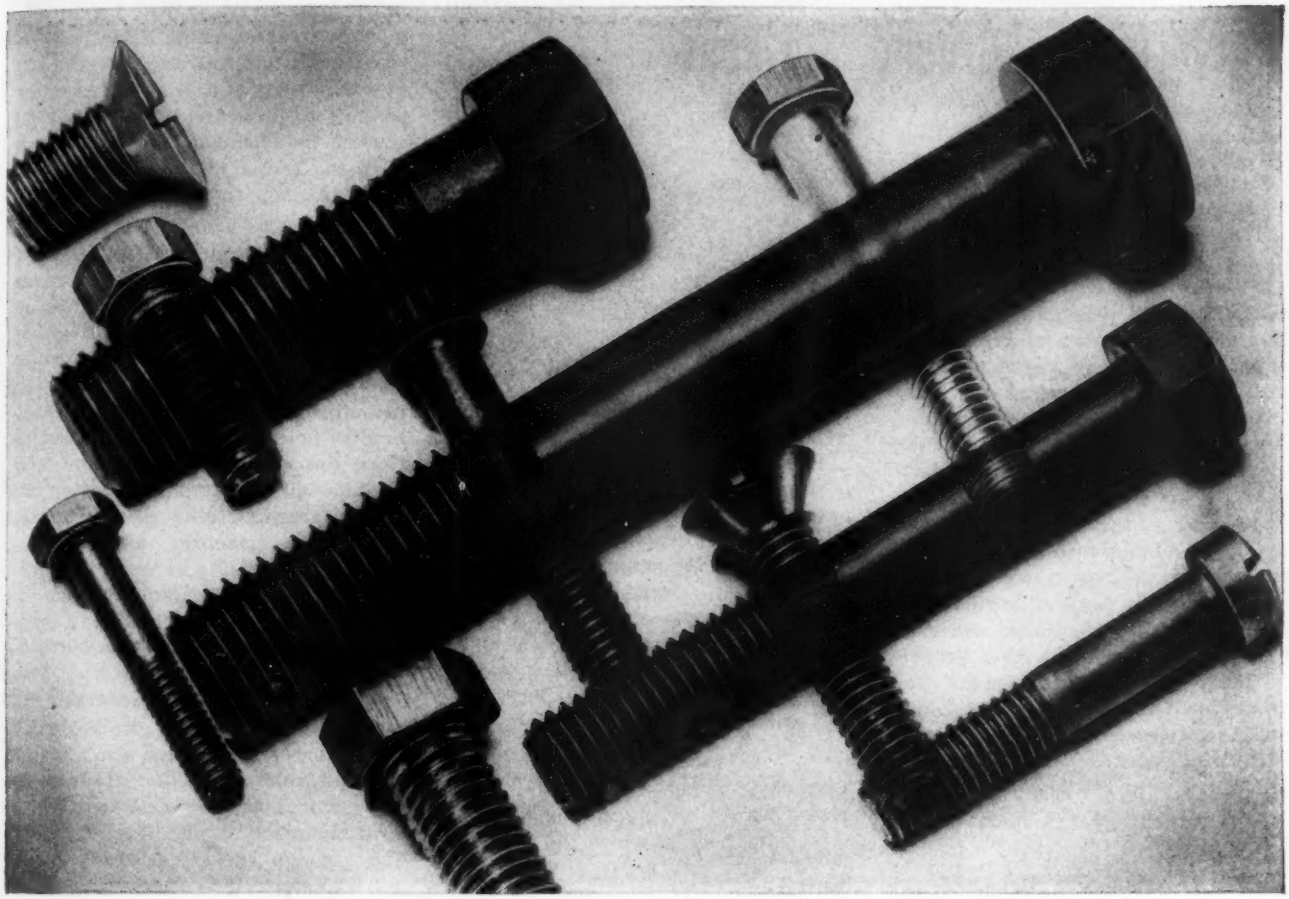
When the grinding conditions are particularly severe in the case of hardened and tempered steel, certain spots in the surface may reach such a high temperature that they become rehardened because they cool instantaneously to the temperature of the rest of the steel, which is relatively cold. If the visible burn marks are ground off and the piece is then etched in nital, the rehardened spots appear white. The area adjacent to each rehardened area must have reached a fairly high temperature, not enough to cause rehardening, but enough to cause considerable softening, and for this reason it appears dark on etching.

An example is shown in Fig. 9. All three pieces of a hardened and tempered steel were ground simultaneously end to end, severely enough to leave brown burn marks on the surface, which are visible in the piece on the left. The other two pieces were then ground crosswise very gently with a soft wheel, about half of the burned surface being left untouched. About 0.002-inch was removed in this manner, the new surface showing no sign of the original burn. The piece on the right was then etched in 10 per cent nital for 30 seconds, and the rehardened areas appear white while the softened ones are quite dark. The left edge of this piece was not burned appreciably in grinding and is a neutral gray. Thus the burn marks were made to reappear after the original burn color had been purposely destroyed by the gentle cross-grinding operation.

Hardening caused by too severe a grinding operation can also be observed in soft steel provided it is capable of being hardened by quenching. For example, tool-steel bar stock that is improperly cut off with an abrasive wheel may have a very hard cut surface, which is likely to cause tool breakage when the piece is machined. Such a surface will etch white, in spots or all over, depending on the extent of injury, while the rest of the steel will etch a light gray corresponding to its normal condition.

A procedure has been recently developed to improve the sensitivity and contrast attainable with burned surfaces of hardened steels other than high-speed. This involves etching for 15 seconds in a 4 per cent solution of nitric acid in water, rinsing in hot water and then in acetone, and finally etching for 15 seconds in a 2 per cent solution of hydrochloric acid in acetone, followed by rinsing. (Percentages are by volume.)

An example of the high contrast obtainable with these etchants is shown in Fig. 10. The piece of oil-hardened tool steel at the left was badly burned by bringing the grinding wheel down forcibly on the sur-



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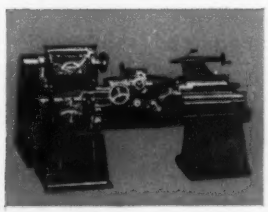

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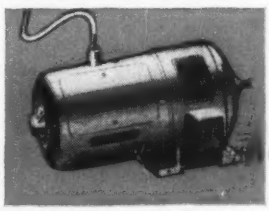

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face when the table was stationary. The original burned area is clearly visible.

The other piece was mistreated in the same way but all trace of burn was then removed by grinding in normal fashion below the bottom of the gouged-out portion, leaving an apparently undamaged surface. Etching, however, indicated at once that this part of the surface had been completely rehardened, while the immediately surrounding area was softened by the heat flowing out of the region in contact with the wheel. Hardness measurements showed that the rehardened region was rockwell C64.5 while the rest of the bar was C61, this being the usual hardness of this particular steel when properly tempered after quenching. The rehardened zone was entirely too hard, experience having proved that such high hardness in this steel is associated with brittleness.

Subsequent traverse grinding operation used to remove the visible burn caused a slight tempering of the rehardened area, as shown by the moderately dark spots inside the white area. This is a good example of how a suitable etching technique can bring out burn effects that have been apparently removed.

After a part has been etched in order to detect burn, the last traces of acid must be neutralized if it is to be kept from rusting. A few minutes in a weak solution of ammonium or sodium hydroxide suffices. It is considered good practice to dip the piece in a rust preventive solution as the final step in its preservation.

Detection of burn by any of the etching procedures as described is, in most instances, a nondestructive process. Experience has shown that parts inspected for burn by etching can generally be placed in service without any noticeable effect upon their useful life. Although the work is discolored, there is no appreciable dimensional change. The discoloration can be removed, if necessary, by polishing or other surface cleaning methods that leave a good finish on the work.

Condition of Wheel Face—Cracks and burn are caused by excessive heat produced in the steel at the points of contact with the grinding wheel. Some heat is inevitable since it is developed in cutting out tiny chips of metal and plastically deforming them until they break away from the surface. In addition, there

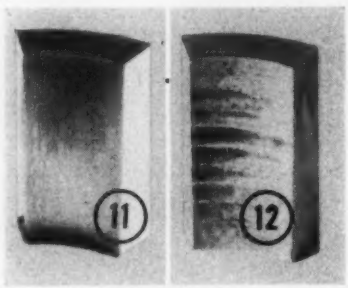

Fig. 11—*Portion of internally ground hardened steel ring, showing a system of fine parallel cracks brought out more clearly by the magnetic particle method*

Fig. 12—*Same piece as in Fig.* 11, *but etched to reveal severe burn marks, caused by improper grinding. Burn marks coincide with the fine cracks*

may be rubbing or frictional heat, which serves no useful purpose.

A dull wheel, in which the abrasive grains have flat areas in the plane of cutting, always generates more heat than a sharp wheel, in which the grains contact the surface with sharp edges or corners. An extreme case of a dull wheel would be one having a perfectly smooth surface with no porosity; such a wheel would not cut at all but would create a great deal of heat, the metal absorbing it by acting as a brake.

Even when the abrasive grains are sharp, considerable frictional heat will be developed if the wheel is loaded. The presence of metal particles in the surface of the wheel results in metal to metal contact, which is accompanied by excessive heat.

A wheel to be used for stock removal should be dressed properly to leave all the grains as sharp as possible. The diamond should be sharp, it should be fed across the wheel at a moderately rapid rate and, depending on the type of machine, the wheel should be fed an appreciable amount toward the diamond at each pass, say 0.001-inch. To decrease the downfeed or infeed to practically nothing near the end of the dressing operation is permissible only for finish grinding, when light cuts are to be made; the same is true of feeding the diamond slowly across the wheel. If stock is removed rapidly with a wheel purposely dressed fine for finish grinding, cracking or burning of the work is likely.

In regard to keeping the diamond sharp, this should be done by turning it every so often in its holder; otherwise, a flat will gradually develop on the diamond and it will no longer be possible to dress the wheel sharp. Of course, the diamond must be offset from the center of the wheel; otherwise, turning the diamond will be useless.

After the wheel has been dressed, continued grinding with it may cause the condition of the wheel face to change. If a wheel is on the hard side for a given operation, the abrasive grains will be held too firmly in place by the bond to be torn out as soon as flats have developed on them; thus, the wheel face will eventually become dull or glazed. It is often observed in practice that such a wheel, although satisfactory shortly after dressing, gradually starts to burn the work and sometimes even to crack it. The same thing will happen if the wheel becomes loaded during use.

Shape and size of the surface being ground may affect the condition of the wheel face. When small pieces are being surface ground, the repeated contacts of the grinding wheel with their edges may keep it sharp even though the same wheel would dull rapidly if it were used to grind a single large piece of steel having an uninterrupted surface and the same total area as the small pieces. A softer wheel might be necessary to avoid injuring the large piece.

Wheel and Machine Variables — One of the most important factors in avoiding injury to ground surfaces is to choose a wheel of the right grade. Too hard a wheel will burn or crack the work, while too soft a wheel will wear too rapidly. The best wheel for the precision grinding of hard steel is the hardest one that does not injure the work, it being assumed that the rest of the wheel specifications have been properly selected from the standpoint of injury and of other relevant factors, such as surface finish.

Another way to change grinding severity is to vary the infeed or downfeed. Very often a decrease in this machine variable will eliminate cracking or burn that is otherwise experienced. A decrease in the wheel speed makes the wheel act softer and thus reduces the chances of injury. The same is true of increasing the rate at which the work moves past the wheel.

Effect of Heat Treatment — The metallurgical condition of the steel may have a lot to do with whether surface cracks will be formed when it is ground. Steels that crack readily during or after grinding are often

Injuries in Ground Surfaces

said to be sensitive to grinding. Sensitivity simply means that the steel is brittle insofar as the grinding operation is concerned although it is not necessarily brittle according to ordinary standards of brittleness for hard steels.

If steel is not tempered after hardening, it contains untempered martensite, which is brittle and easily cracked on grinding. Tempering a plain carbon or oil hardening tool steel at 350° F for 1 hour is enough to make it much less susceptible to cracking during or after grinding.

Hardened steels are likely to crack in grinding if they contain any appreciable amount of retained austenite. This is because retained austenite is unstable and may transform into martensite when acted upon by the localized heat and stresses of grinding. Elimination of retained austenite by suitable tempering has been found to make hardened steel much easier to grind without cracking.

In high-speed steel, considerable retained austenite is present after quenching. This is usually eliminated by tempering at 1050° F, which causes it to transform to martensite upon cooling to room temperature. The freshly formed martensite, not having been tempered, is quite brittle; experience shows that steel in this condition is easily cracked in grinding. A second tempering at 1050°F or slightly lower has been found to eliminate the grinding difficulty in such cases.

Carburized steels cause more difficulty in grinding than any other kind. The trouble is always traceable to an unsatisfactory condition of the cementite, which is very easily cracked if it is massive or in the form of a heavy network.

In order to eliminate such cracking, it is necessary to get rid of the unfavorable distribution of cementite. This can be done by permitting the carbon to diffuse into the steel. Diffusion is accomplished by leaving the steel at the carburizing temperature for several hours but in a neutral rather than in a carburizing atmosphere. Another method involves slow cooling from the carburizing temperature so that the thin layer containing excessive carbon can be machined off. The steel can then be hardened and ground safely.

Examples of Trouble Shooting — Numerous factors may be responsible for the appearance of cracks or burn in ground surfaces. Assuming that experience or test has shown the effect to be injurious to the usefulness of the part in service, the practical question is what should be done about the processing of the parts. This depends not only on the factors that are causing the injury but also on other circumstances. For example, one solution may be best if it is necessary to get out of trouble immediately while a totally different solution may be called for if trouble is to be avoided in the future at minimum over-all cost.

Spalling of Internally Ground Cylinders — A group of thick-walled cylinders made from carburized and hardened steel were found to be badly spalled when they were internally ground. A portion of one of these is shown in Fig. 5. Etching in the usual manner failed to reveal any significant burn. At first it appeared that the steel was too brittle as a result of poor heat treatment, but investigation showed that these cylinders were always purposely left in the quenched condition, without being tempered at all, to make them as abrasion resistant as possible. Since previous lots of such cylinders had been ground without any difficulty from spalling, the wheels were checked and it was found that by some mistake they were one grade harder than they should have been. No more spalling was experienced when wheels of the proper grade were again used.

Fine Cracks in Hardened Ring — In another instance, a large number of very fine, short cracks were observed in the internally ground surface of a hardened steel ring. A portion of the ring is shown in Fig. 11, where the cracks are brought out more clearly by the Magnaflux method. There was no trace of visible burn, but etching resulted in the pronounced burn streaks shown in Fig. 12. The darkest of these are seen to coincide exactly with the cracks in the adjoining illustration. This exact correspondence proved beyond a doubt that the grinding had to be corrected in the direction of lesser severity, and that the heat treatment was not at fault, as was first claimed.

Cracking of Worm Threads — A problem that turned out to be somewhat more complicated to solve involved case-hardened worms about 1 inch in diameter. These were hobbed, carburized, hardened and ground. From time to time, certain lots were found, after grinding, to be cracked in the thread roots. Both grinding and heat treatment were suspected but the source of the trouble could not be located. Changes in heat treating or grinding conditions would apparently cause the trouble to disappear, but then the cracks would come back again in some of the later lots.

When a portion of a cracked worm was etched to see if it had been burned, it was found that the root and sides of the thread became very dark, thus indicating severe burn. In addition, small patches of white martensite, caused by rehardening, were observed, primarily near the point at which the thread first began to be ground. The white spots were distributed in a regular chatter pattern. On the other hand, a worm that was crack-free as shown by the Magnaflux test, did not darken upon etching. This appeared to point to improper grinding as the cause of cracking.

The grinding operation was looked into more carefully and it was found that excessive stock left from the hobbing operation had to be removed from some of the worms, and it was these that were burned and cracked. To avoid excessive stock removal, it was decided to introduce an extra grinding operation directly after hobbing. In this way, only a comparatively small and uniform amount of stock had to be removed in the final grinding operation, when the steel was hard and susceptible to cracking. No further trouble was encountered once it was recognized that the worms had to be prepared to closer limits before they were ground in the hardened condition.

Stress-Relieving Treatments—Occasionally it happens that the ground surface of a hardened steel part is stressed very highly in tension but still it is not cracked when it is inspected directly after grinding. As a result of such high stresses, however, the surface may start developing cracks at a later time. The delay may be an hour or it may be a matter of several days. In such cases it is often possible to salvage the parts by stress-relieving them directly after grinding at a low enough temperature so that the hardness will not be appreciably lowered. One or two hours at 350°F is often sufficient for most steels other than highly alloyed tool steels, for which much higher temperatures may be required.

From data presented by the author in "Injury in Ground Surfaces", published by Norton Co.

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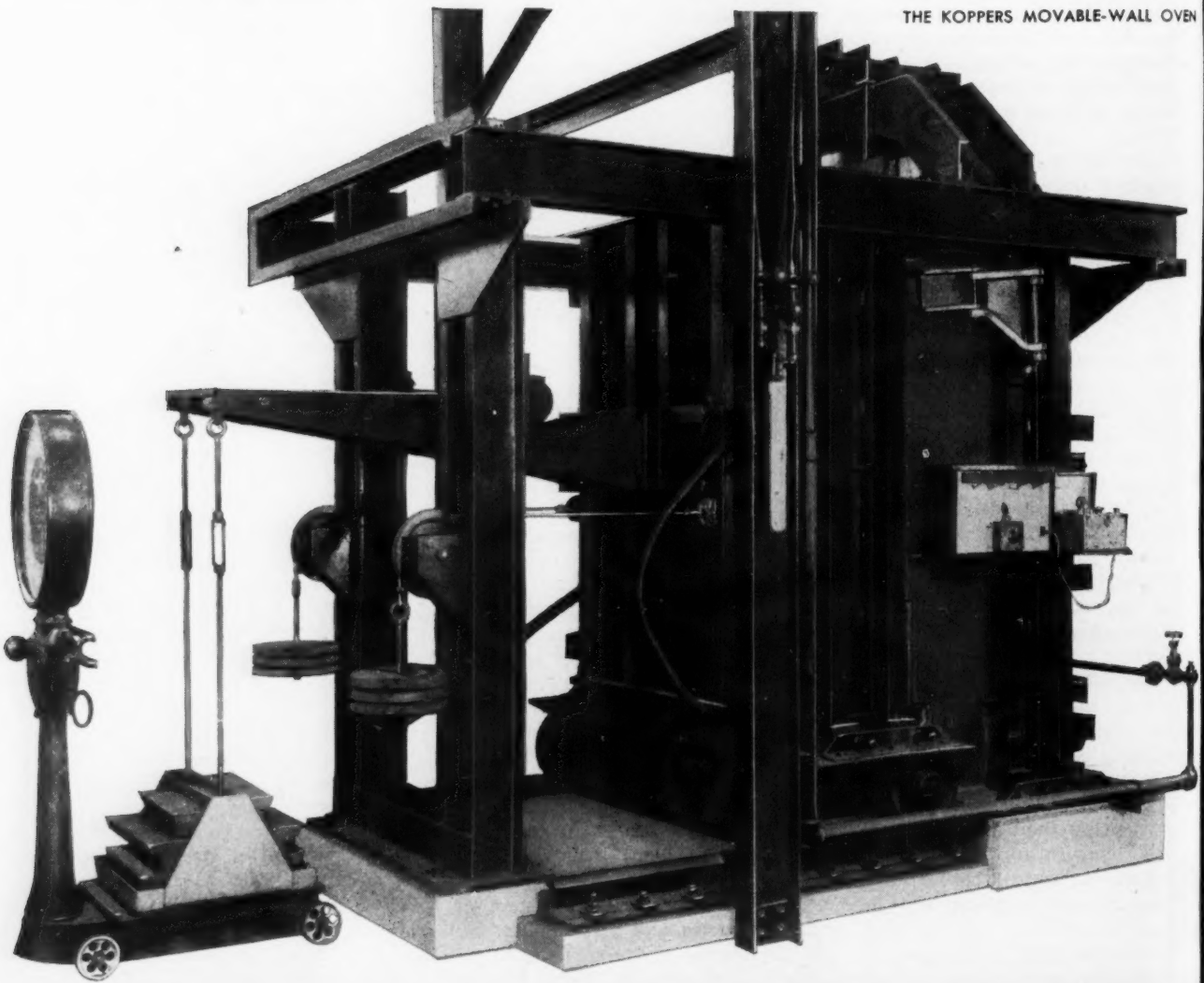

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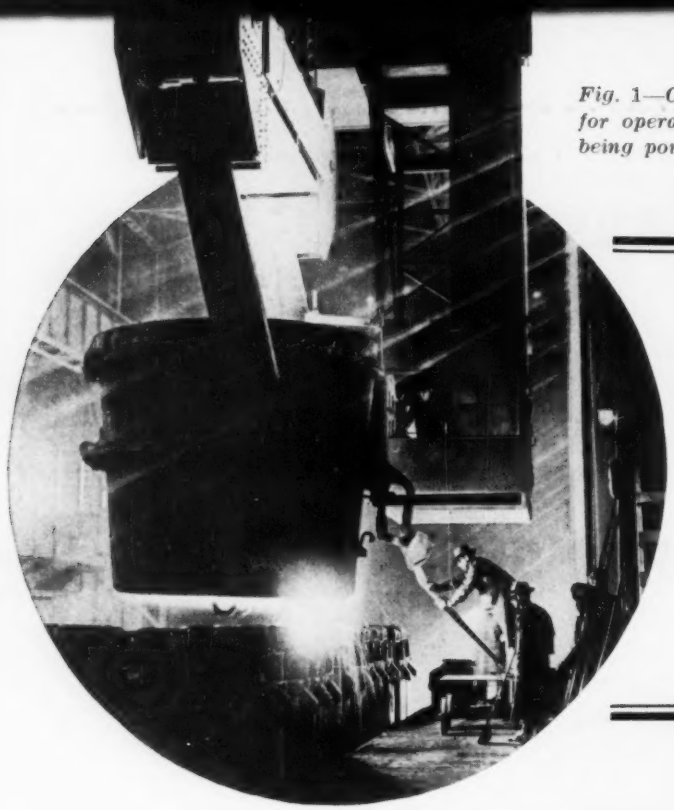

Fig. 1—Cab cooler on ladle crane makes it possible for operator to work in comfort when ingots are being poured. Heavy steel plate mounted below cab deflects heat and aids cooling

Crane Cab Cooling

. . . possible at high operating temperatures

MANY branches of the steel industry can use the crane cab cooler developed by Dravo Corp., Pittsburgh, which provides for removal of noxious fumes as well as cooling. Originally installed 2 years ago on a 185-ton ladle crane in the Aliquippa works of Jones & Laughlin Steel Corp., Pittsburgh, additional installations have been made on two other ladle cranes, three soaking pit cranes and a converter crane. Cooling units could also be installed on cranes in rolling and slab mills, strippers, open hearths and blast furnaces.

Early attempts to cool crane cabs used fans, cakes of ice and dry ice. These methods were unsuccessful because they provided no temperature control, did not remove the fumes and required frequent stops for replenishing ice supply. About 12 years ago units employing water as a condensing medium were devised. Because the water was rapidly heated by the surrounding air, the unit had to operate at high pressure causing piping connections to break and burning out motors and other electrical equipment.

Present installations call for insulation of roof and walls of the cab with 3 inches and floor with 3½ inches of fiber glass. In addition a steel heat shield is suspended 6 inches below floor of cab. Where working temperatures no higher than 125°F exist, sufficient cooling capacity is contained in unit without insulation. All duct work is eliminated by mounting self-contained cooling unit directly on top of cab.

Freon 114 is used as the refrigerant because it has a high boiling point and permits low operating pressures under extreme conditions of high ambient temperatures. Twice filtered air is provided for cab and motor ventilation. Circulating air for cab is supplied at 400 cubic feet per minute. Three-fourths of this is recirculated, while balance is make-up air brought into unit through two filters and activated carbon canisters for removing noxious fumes. For winter heating, air passes over electric strip heaters.

Temperatures within the cab are held at 80° F automatically and continuously although air surrounding the crane is 140° F. During the two years of the unit's operation there have been no breakdowns and normal replacement of filters has been the only maintenance.

Cooler units are being used in other plants on electric furnace, forge shop, ladle and soaking pit cranes. Ford Motor Co., Detroit, has installed a cooler on the cab of a new full vision 250-ton stripper and extractor crane.

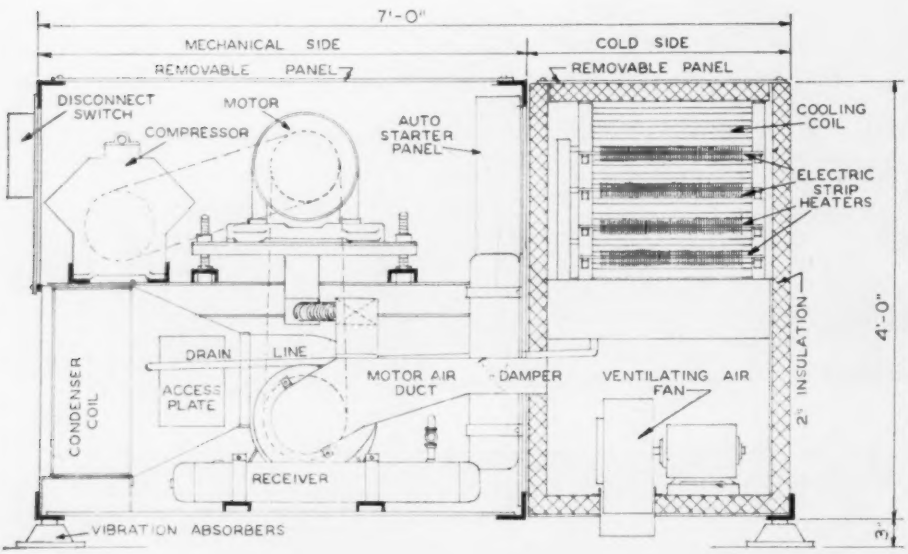

Fig. 2—Front view of entire unit used for cooling and cleaning air

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NORTON ABRASIVES

Quenching Oils—*Continued from Page 66*

Solutions — Either water or water solutions provide the fastest quench and, therefore, the highest hardness, other things being equal. This does not imply that water is the best quenching medium, however, since end results other than hardness of the quenched piece must be considered. Such factors are, as stated, (1) uniformity of hardness as a function of the size and shape of the quenched piece, (2) dimensional stability or nondistortion, (3) freedom from cracking, checking, etc. For these reasons water is limited in use as a quenching medium to only certain classes of shallow hardening steel, such as the low carbon types.

A method of approach, in the use of water, is the interrupted quench procedure wherein several quenching media, including water, are used successively. The piece to be hardened is first quenched in water for a specified time, then withdrawn while still at an elevated temperature, about 500-600° F, and quenched in a slower medium such as oil or air in order to minimize distortion and quenching strains which occur in the lower temperature range of the cooling process.

In addition to fast cooling, water possesses the advantages of low cost, ready availability, ease of handling and cooling in spray towers, uniformity in service and easy disposal. For some classes of water-hardening steel, where even faster cooling is needed, it has been found desirable to use water solutions incorporating either brine or caustic soda. Usually about 9 per cent of the former or 6 per cent of the latter, by weight, are employed for best results.

It has been determined, for example, that a 5 to 6 per cent caustic soda solution will withdraw heat from steel at almost twice the rate possible with water alone. Caustic solutions are also claimed to give more uniform hardening results with a minimum of soft spots on the surface of the quenched piece. The caustic solution is superior to water in its ability to remove scale from the piece and permit more uniform contact of the work surface by the solution. In the initial phase of cooling, the caustic solution tends also to shorten the time of formation of the water vapor blanket surrounding the hot immersed piece, and thereby effect a faster rate of heat withdrawal in the initial stages of quenching.

In the use of either brine or caustic quenching solutions, a timed or interrupted quench must ordinarily be employed, in the same manner as with water, to avoid stresses and cracks. Since caustic solutions, upon contact with air, form objectionable sodium carbonate by combining with carbon dioxide from the air, they cannot be cooled through spray towers nor can air be used for bath agitation. The best method is use of a dual system wherein the caustic solution is agitated merely by circulation through a heat exchanger containing cooling water which in turn is circulated up to a spray tower for cooling.

Due to the particular merit of caustic solutions in removing scale from heated steel, they are especially useful in quenching forgings which usually carry a heavy scale from the forging operation.

Mineral and Compounded Oils— Mineral oils, either straight or compounded, are commonly used in industry for a wide variety of quenching operations where both hardness and dimensional stability of the quenched piece are necessary. Tool and constructional steels, both carbon and alloy types, are usually oil quenched in practice.

Mineral oils do not possess the high specific heat, latent heat of vaporization and thermal conductivity characteristic of water. As a group, therefore, they have only about one-third the cooling effectiveness of water for quenching. However, because oil hardening alloy steels are coming more and more prominently into industrial use, and because of the limitations of water cooling with respect to thermal distortion and nonuniform hardening, quenching oils of several types have become more and more widely used.

Under proper control of quenching oil formulation, use of addition agents, quench bath temperature controls, and bath agitation methods, oils have demonstrated the usefulness which accounts for their present prominence in the heat treating field. All quenching oils, of whatever type, should possess the following general characteristics for satisfactory performance:

1. Good cooling or high heat transfer in initial stages of the quenching sequence.

2. Suitable viscosity at quench bath temperature to permit optimum circulation and to minimize oil carry off loss on quenched parts.

3. Low volatility at quench bath temperature, as characterized by high flash point and ignition temperature, in order to minimize losses from volatilization, and to avoid fire hazards.

4. Good thermal stability to resist formation of detrimental sludge and oxidation products in the oil. This is requisite to uniform hardening results and reasonable service life of the oil.

5. Moderate cooling rate in the final or C stage of quench to prevent or minimize cooling strains in high carbon or high alloy steels.

Relative Service Characteristics — These service characteristics, it is realized, must necessarily be relative and within the range of reasonable expected service for such products, not overlooking the importance of (1) oil selection for the particular composition of steel to be hardened, (2) oil bath volume, (3) temperature, (4) agitation, (5) production through the quench bath, (6) heating furnace atmosphere as related to scale formation on piece, and (7) mechanical maintenance practice affecting the heat treating equipment itself.

Some industry heat treaters and metallurgists believe that insofar as quenching is concerned, "oil is oil," and that the cheapest light neutral oil obtainable is the best for the purpose. While for some quenching applications an ordinary 100-second viscosity straight mineral oil has demonstrated usefulness, there are strong indications, based on critical investigation, that more specialized types of quenching oils are preferable for more critical work where high as-quenched hardness and lack of distortion are both problems.

A new type of such an oil is so formulated and designed as to increase the cooling rate in the initial stages of quenching beyond that normally obtained with either ordinary mineral oils or simple mineral-fatty oil blends. The latter blends have sometimes been recommended as superior to straight mineral oils. There is little evidence, however, that they possess any measurable quenching efficiency over straight mineral oils despite claims of increased wetting-out characteristics.

New high speed quenching oils, while fast in the early stages of the quench, retain a desirable slow rate of cooling in the final C stage characteristic of most mineral quenching oils. They, therefore, combine properties providing for maximum hardness and minimum distortion in quenching a wide variety of industrial steels utilizing conventional heat treat methods.

Evaluation of the performance of such a product developed by Shell Oil Co. has been made both by thermal

and metallurgical end-use methods. Thermal evaluation methods employed involve use of (1) center cooling curves of quenched specimens and (2) interval quench efficiency ratings based on calorimetric measurement of heat extraction from the specimen immersed in the quench bath.

Laboratory Quenching Apparatus—Figs. 2 and 3 illustrate research laboratory quenching apparatus set up to secure both cooling curves and interval quench efficiency ratings for various experimental and commercial quenching media.

Fig. 2 shows the test control panel and temperature recording instruments. In the lower right hand corner may be seen a partial view of one of three automatic quenching units, shown more clearly in Fig. 3. Essentially each unit consists of a quench bath contained in a calorimeter, above which is mounted an electric heating furnace. The quench bath is equipped with an electric stirrer.

In operation, a stainless steel specimen 3 inches long by ¾-inch in diameter, and mounted on a hollow tube through which a thermocouple is connected to the center of the specimen, is heated in the electric furnace to a given temperature (1500° F) and then immersed automatically into the quench bath for a predetermined interval by an electrically timed, air-actuated cylinder mechanism. The timer setting accurately controls the period of immersion, and therefore, the interval of quench. The calorimeter unit is equipped with a water cooling coil, a heating coil, an automatic temperature recorder, stirrer, and temperature control unit.

Various bath temperatures may be established before the start of test. Temperature ranges of 80° to 140° F were employed in work done with this equipment. Center cooling curve data for the given specimen and quenching media were tabulated and transferred to chart form for graphical depiction. Tests were made at various quench bath temperatures both with and without agitation of the fluid.

Stainless Steel Specimens — Stainless steel specimens (25-12) were used in the tests because for the temperature range studied, no transformation occurs in this steel. None was desired since thermal evaluations only are made in this particular phase of the test setup.

Interval quench ratings are based on a comparison of (1) bath temperature rise for any given time interval of quench with (2) bath temperature used for full quench of the specimen down to equilibrium bath temperature. By this means the rate of cooling for any given time interval from the beginning of quench could be determined, and a comparison made among quench media with respect to quench efficiency.

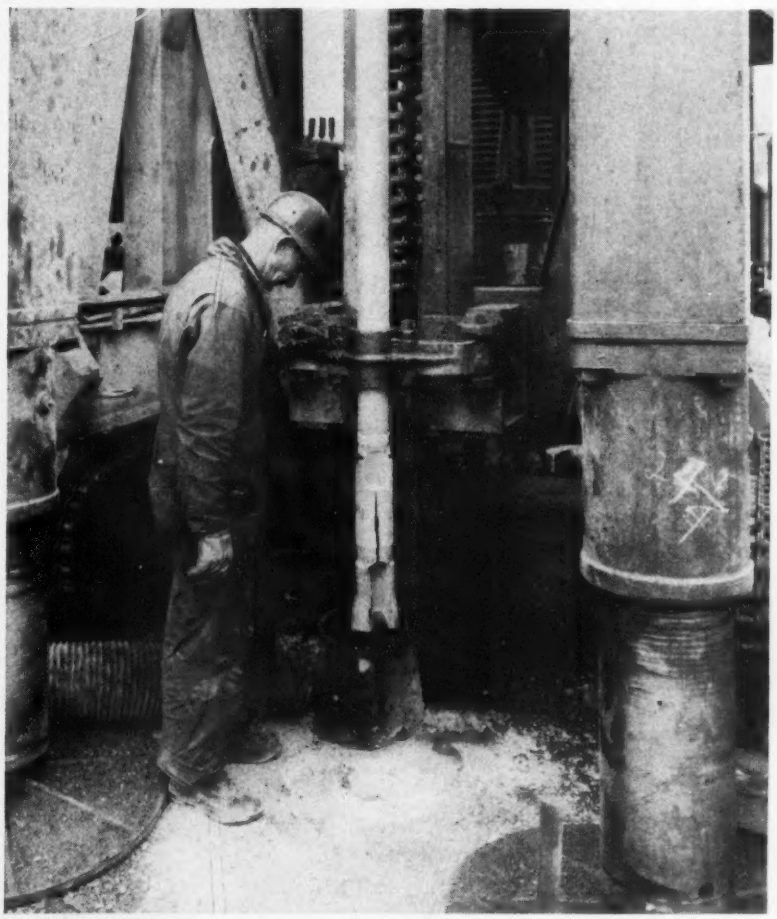
Table II illustrates comparative data on several oils for interval quench efficiencies. Fig. 1 shows center cooling curves for quenching in these same oils.

Metallurgical methods, in addition to thermal methods, were employed to evaluate the quenching merit of these oils as well as a number of experimental fluids. It was found that end quench methods do not adapt themselves readily to this work (i.e., as a means of rating quenching fluids) because the factors involved in end quenching are not the same as those in total immersion quenching. In end quench methods, the comparative effect of fluid composition and of additives in altering the A and B stages of cooling cannot be evaluated. This is because the mechanical wiping action of the quench stream on the specimen surface disrupts the vapor layer with resultant cooling effects outweighing any that may be ascribed to fluid composition.

(To be concluded)

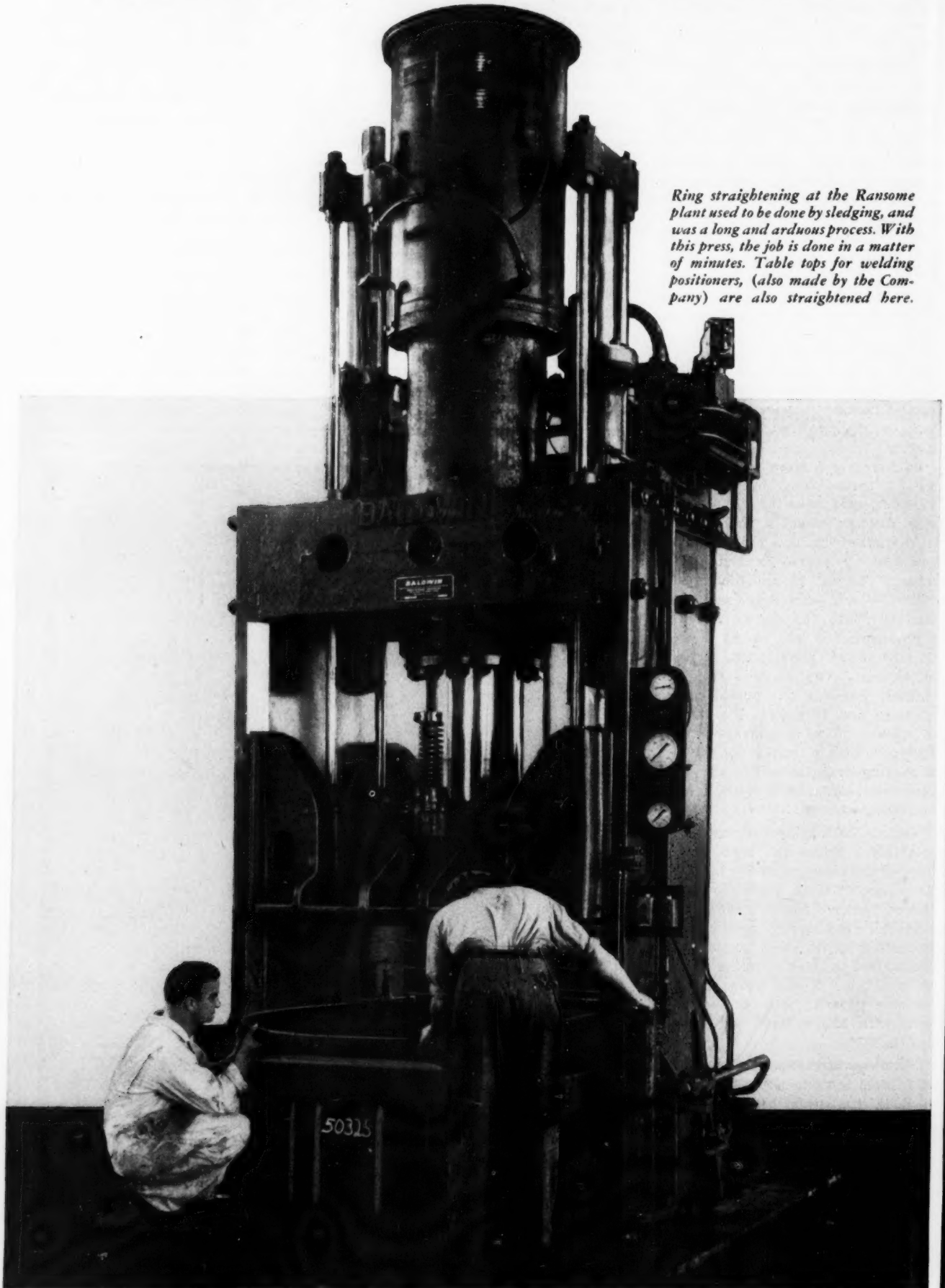
—o—

Information on hole punching units for use in stamping press or press brake is contained in an illustrated catalog prepared by Wales-Strippit Corp., North Tonawanda, N. Y. Procedures for setting up punching units on mounting templates and T-slotted plates are illustrated and explained. Also shown are hole punching patterns and possible shapes of holes that may be punched with available equipment.



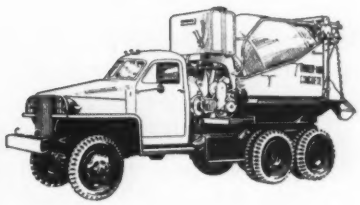
SELF-PROPELLED: Capable of more than 200 blows per minute, this air-operated, piston-type rock drill is one of the features of self propelled unit developed by Ingersoll-Rand Co., Phillipsburg, N. J., for strip, open pit mining and quarry work. Chip removal is accomplished by passing compressed air down through hollow drill steel forcing chips to surface in space between steel and walls of hole. See STEEL p. 57 Feb. 16, 1948

How the "Ransome" became an

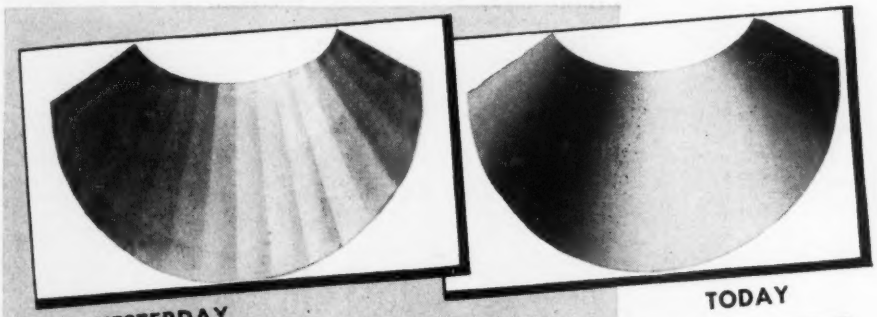


Ring straightening at the Ransome plant used to be done by sledging, and was a long and arduous process. With this press, the job is done in a matter of minutes. Table tops for welding positioners, (also made by the Company) are also straightened here.

even better mixer with BALDWIN HYDRAULIC PRESSES

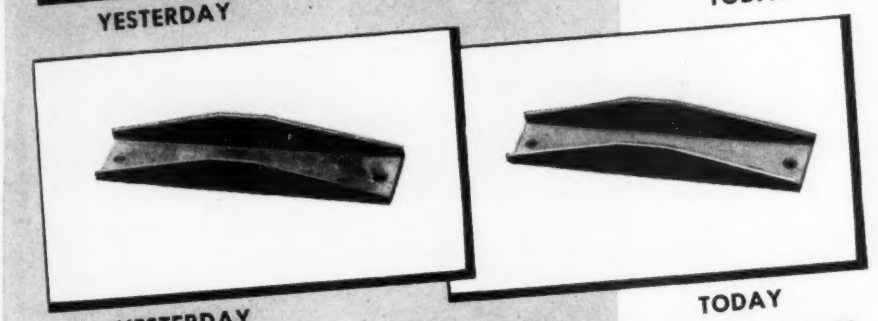


On highway and construction projects everywhere you'll see Ransome "Blue Brute" concrete equipment—dual and single drum pavers, "Hi-up" truck mixers and agitators, large stationary mixers and smaller portable mixers. Intent on continuously improving its equipment, and faced—like all manufacturers—with the necessity of reducing costs, Ransome, in 1947, attacked these twin problems by installing a Baldwin hydraulic press. The reduction in production operations, and the improvement in results, are indicated by the typical examples shown. Baldwin-Southwark Hydraulic Presses are helping manufacturers in many lines to make better products, at higher speed, and at lower cost. If you look, you can probably find places in your factory where a Baldwin press could serve you. If you would like to see a Baldwin representative, please get in touch with the nearest Baldwin office.



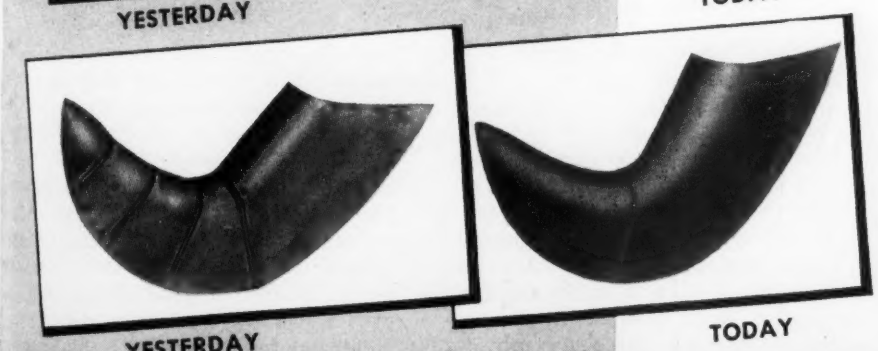
YESTERDAY—*Discharge chutes, of various types and sizes, were formed on a brake, by as many as 30 separate operations.*

TODAY—*The sheared blank is placed on a die, and formed to smooth, exact shape in a single operation.*



YESTERDAY—*Drum door holddown plates were formed on a brake, in two operations.*

TODAY—*The holddown plates are formed on the press with one stroke of the ram.*



YESTERDAY—*Individual sheared segments were bent, assembled in a jig, and welded. Each weld left a "dam" to obstruct the smooth flow of concrete.*

TODAY—*Long sections of the discharge blades are formed in one operation. In addition to cost reduction, the unobstructed floor means better product performance.*

BLW THE BALDWIN GROUP

The Baldwin Locomotive Works, Philadelphia 42, Pa., U. S. A.

Offices: Boston, New York, Philadelphia, Birmingham, Houston, St. Louis, Chicago, Cleveland, Pittsburgh, San Francisco, Seattle, Washington.

Dual standpipes through which gas is conveyed from each oven to collecting mains control carbon build-up at roof level thus minimizing smoke during charging operation and improving gas yield. Coke temperature at time of pushing oven is measured by pyrometer mounted on coke guide

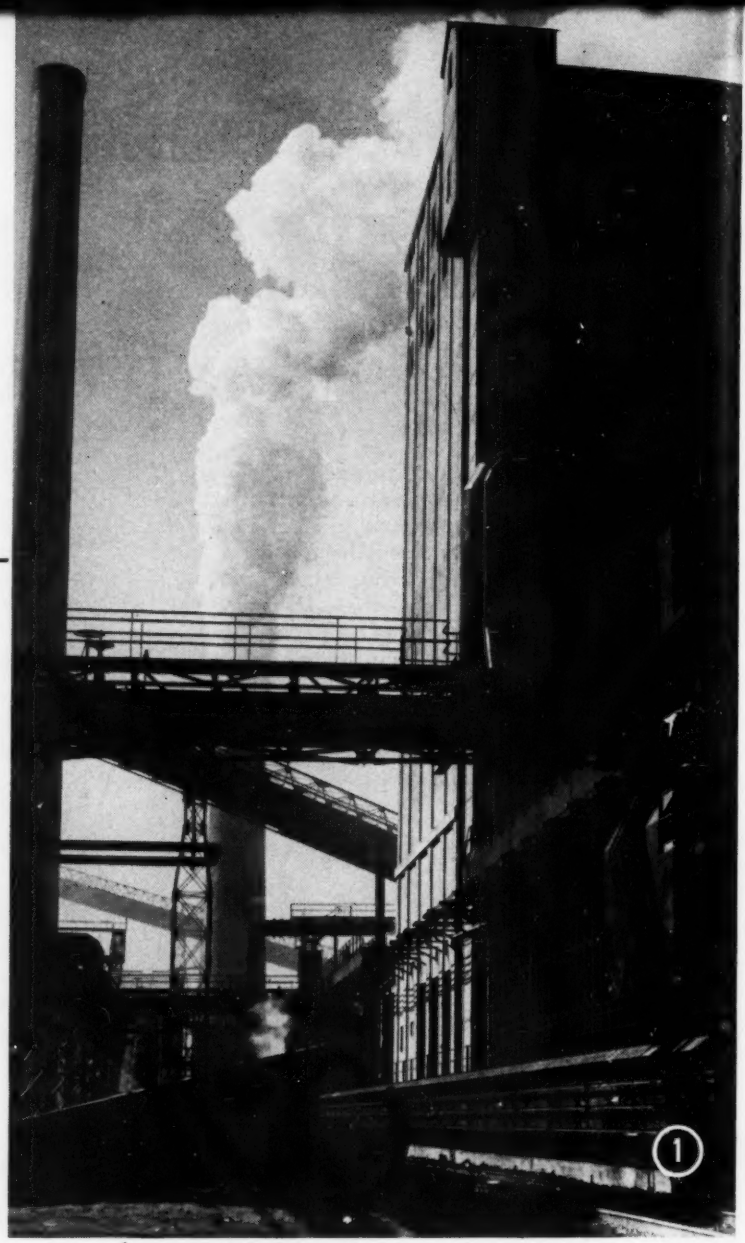


Fig. 1—Coke side of new ovens showing concrete coal bunker

MODERNIZED

Coke Producing Facilities

Boost National Tube's Output by 800,000 Net Tons

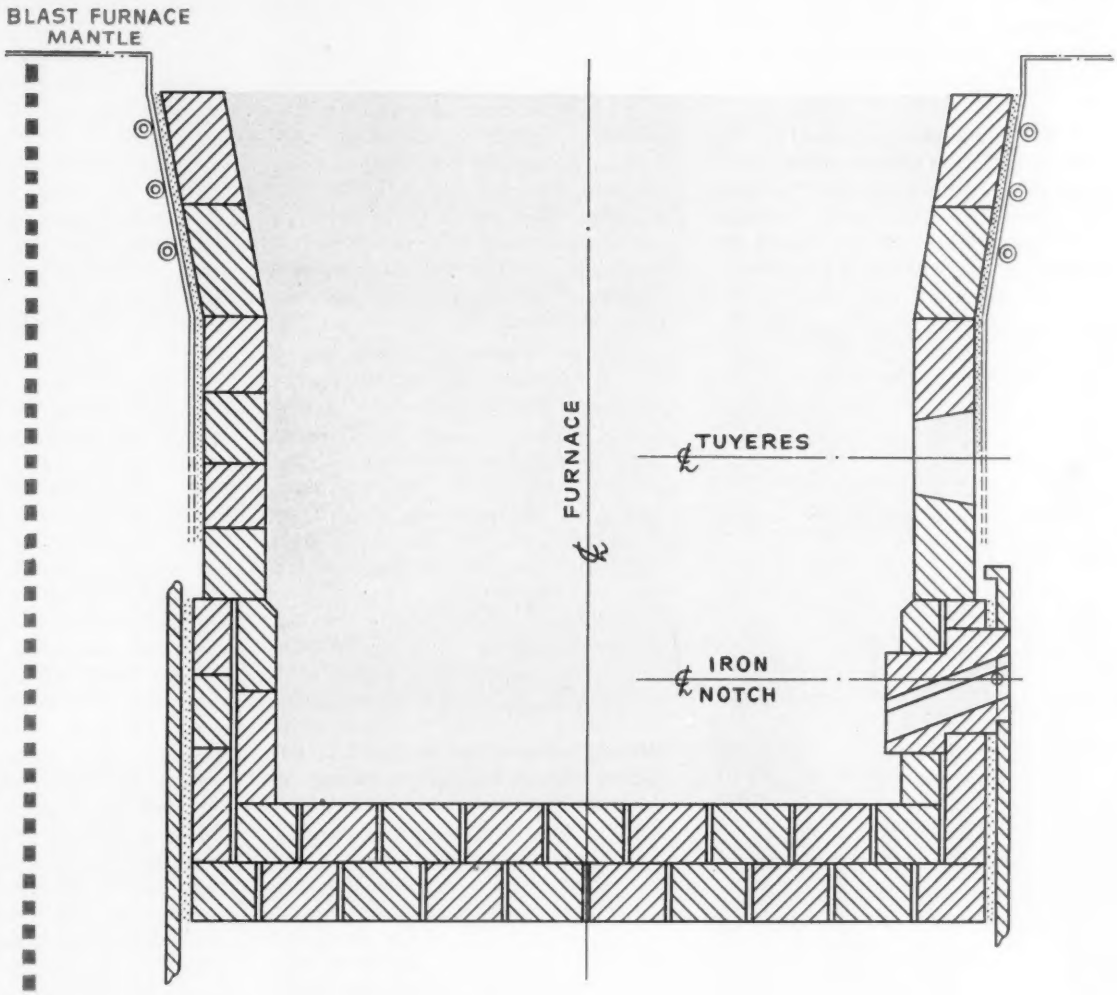
COKEMAKING capacity at the Lorain Works, National Tube Co., Lorain, O., has been increased to a total of 1,650,000 net tons annually by the addition of new coke ovens with an annual capacity of 800,000 net tons. The installation consists of three batteries, each of 59 underjet-fired low-differential, regenerative ovens. Approximate dimensions and capacity of each oven are presented in the accompanying table.

The ovens are of the 4-divided type, each consisting of two outer zones and one double inner zone and are designed for firing with coke oven gas having a calorific value of 500 to 550 Btu cubic foot. Later they may be underfired with blast furnace gas by the installation of suitable auxiliary equipment. Provision has been made in plant layout and design for the construction of three additional similar batteries of ovens should conditions warrant.

Regenerators are filled with slotted type fire clay checker brick. The bus flues beneath the checker chambers are built up independently of the pillar walls. They are lined with fire clay shapes, with joints staggered both horizontally and vertically with the joints of adjacent brickwork. Steel flashing plates in short lengths having overlapping joints are provided on all bus flue surfaces that are exposed to gas counterflow.

Coke oven gas under regulated pressure is delivered through the main coke oven gas manifold to the under jet system, which comprises the individual wall manifolds with reversing cocks, and connections to the individual flues, each having a metering device. The latter have an orifice accurately bored to 1/2-inch diameter, and a removable concentrically located pin. Gas flow at any desired rate is obtained by changing the nozzle pins, which are of different diameters, in approximately 2½ per cent increments in the gas rate. Sizes are selected to accommodate the gradual increase in gas requirement toward the coke side of the oven to compensate for the gradual increase in oven width (taper) and to meet the additional requirements of the outer end flues.

An alternating arrangement of high and low burners distributes vertically the zone of initial combustion. Air for combustion is supplied through a series of combustion air louvers alongside of the basement opposite the air and waste gas reversing valves. Each louver is fitted with a damper which not only enables the control of the quantity of air as required for com-



Line it up to the mantle... with "National" Carbon

"National" carbon blocks have become the standard material for blast-furnace linings, for iron notches and cinder notches. And now, for real economy and efficiency, the trend in design takes the carbon-block lining up to the mantle.

Here are the reasons:

1. "National" carbon blocks last indefinitely. They have no melting point . . . are highly resistant to slag attack and thermal shock . . . are not wet by molten metal . . . have low thermal expansion . . . and maintain their mechanical strength at high temperatures.

2. "National" carbon blocks are easy to install. One carbon block takes the place of from 50 to 1000 nine-inch firebrick, depending on the size of the block. This means fewer joints, sounder joints, faster installation, and lower cost.

For more information on the use of "National" carbon blocks in blast furnaces, write to National Carbon Company, Inc., Dept. S.

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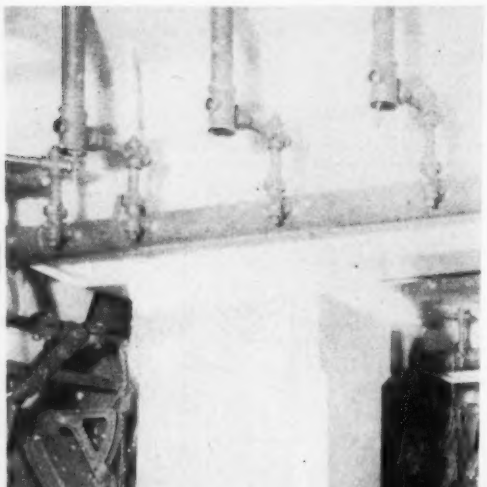
bustion, but also provides for the distribution of this air to effect uniform ventilation of the basement and a uniform temperature of the underjet system.

A waste gas flue is located on the coke side of each battery, with a connecting flue to the chimney. The flues are constructed of Lumnite-cement concrete and are provided with expansion joints at suitable intervals.



A chimney 9 feet diameter by 250 feet high serves each battery. Shaft is built of reinforced concrete, with the upper 25 feet made of 8-inch perforated radial brick laid up with acid resisting cement. A self-supporting lining extends the full length of the chimney, and is built of acid-resisting perforated radial brick, with the top section of 25 feet constructed of second-quality fire brick laid up with acid-resisting cement. Cast-iron cap rings were installed.

Oven door jambs of the self-sealing type are installed on both the pusher and coke side of each oven. Jambs are of cast iron, about 1-1/2 inches thick, cast in one piece with finished contact surfaces to obtain a tight joint when the door is in place. They are secured to the buckstays with clips and bolts. Removable cast-iron door sills are used.

A self-sealing oven door is installed on the pusher and coke side of each oven. These doors are of welded steel construction, with a flexible steel sealing plate and renewable sealing strip. Contact surfaces can be flexed by adjusting screws to conform to any irregularities in the contour of the door jambs. Each door has two cast-steel latch bars for holding the door in place, two spring assemblies exerting a total pressure of 30,000 pounds on the sealing edge of the door, and the necessary guides and hooks for lifting. Doors are lined with first-quality fire brick shapes, held in place by a cast iron sectional frame.

A self-sealing type leveler door with spring arrangement for exerting pressure on the sealing edge is provided on each pusher side door. The leveler door frame is bolted to the oven door frame.

Two standpipes for each oven (one on each side of the battery) convey gas from the oven to the gas collecting mains. They control carbon build-up inside the oven roof, eliminate considerable smoke during charging, and improve gas yield as compared to single standpipe practice. Elbows connect the standpipes to liquor sealed valves. A sleeve connecting the elbow with the standpipe is flanged for connecting to the elbow, with a packed type joint between the sleeves and standpipe. A sheet steel heat shield for each standpipe is secured to the standpipes by bolts.

A U-shaped gas collecting main on each side of the battery has a gross area of approximately 23 square feet at the crossover gas suction main offtake. Each main has the capacity to carry the entire gas load of one battery. The bottom of each main slopes toward the center, at which point the gas and flushing liquor leave. Steel saddles, welded to the mains and spaced at intervals, provide supports for the mains and are bolted to the supports on the buckstays.

One 42-inch diameter crossover main at each battery connects the pusher side collecting main with the offtake main over the quenching track, and is fitted with a regulating butterfly valve assembly, four flushing liquor sprays, and inspection holes having cast-iron plugs. A 42-inch diameter offtake main from the coke side collecting main to the suction main south of the coke quenching track is provided with regulating butterfly valve assembly, two liquor flushing spray nozzles, and inspection holes having cast-iron plugs.

The suction main consists of 42-inch, 54-inch and 60-inch pipe from the off-take mains to the manifold at the inlet side of the new primary coolers. The manifold, 60 inches diameter, has connections to the suction

Fig. 2—View of air reversing valves

Fig. 3—Larry car dumping coal into oven. Feed controlled by rotating table beneath each hopper

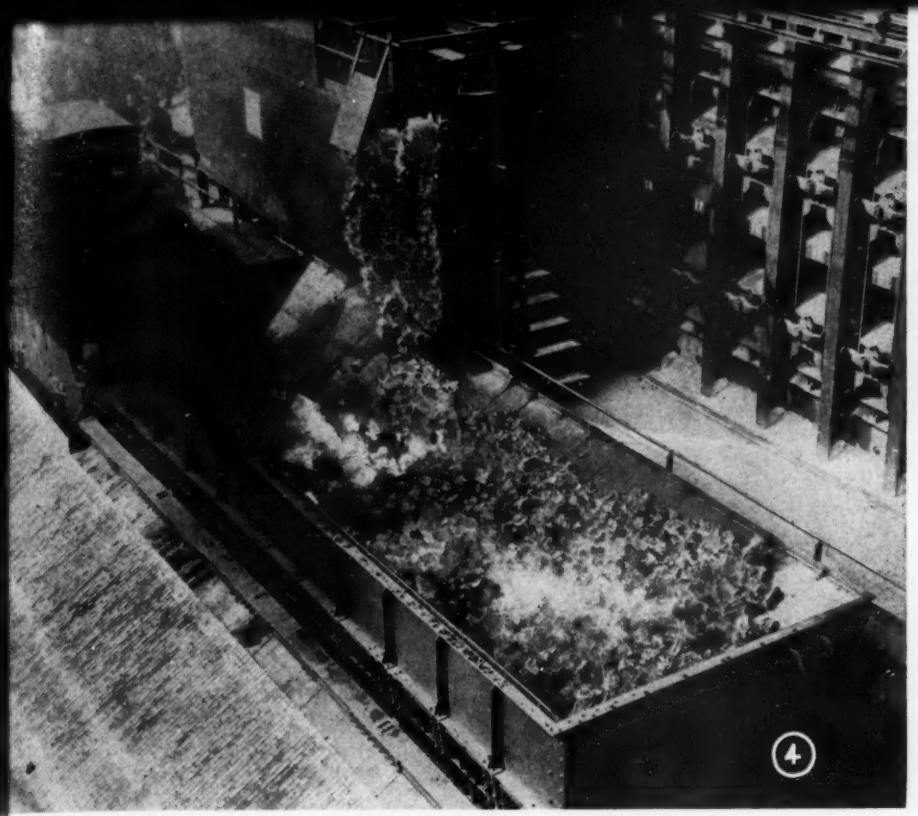


Fig. 4—Coke being pushed from an oven. Quench car receiving coke has a capacity of 10 tons

main and each primary cooler. An expansion joint and an all iron flanged butterfly valve with extension stem and handwheel is installed for each offtake main over the quenching track. A liquor sealed trap at the easterly end of the suction main removes flushing liquor from the gas suction main.

Air intakes are in the pusher side alleyway floor at the end of each battery, for admitting combustion air to the combustion air ducts. The air intakes are covered with welded steel grating. A manually-operated butterfly damper has been provided for each end of the combustion air duct at each battery. These dampers are of the vertical type, operated from the pusher side alleyway.

One twin reversing valve for waste gas is located on the coke side for each regenerator. The valves are of the vertical type, with waste gas ducts connected to the waste gas flue. Flow is controlled by a butterfly valve. Ducts are extended from the waste gas valves to the air reversing valves located in the basements of the batteries.

Each regenerator has two valves for reversing air, with hinged lids for admitting or shutting off combustion air, and finger bars for regulating flow of air (Fig. 2).

Each battery has a mechanism for actuating the waste gas and air reversing valves and the coke oven gas reversing cocks. One fuel gas heater, fitted with approximately 200 square feet of heating surface arranged in cast-iron radiator sections also is provided for each battery. The heaters are covered with blanket insulation protected by a sheet steel jacket.

A chimney draft regulator that operates a damper has been provided for each battery. A collecting main regulator with pumping unit was furnished for each collecting main—a total of two for each battery. The pusher side collecting main and the coke side collecting main operate as a unit, controlled by a timer through solenoid actuated butterfly valves fitted to each regulator. At intervals of 30 minutes, the timer automatically reverses the flow of gas from the pusher side collecting main to the coke side collecting main, and vice versa. The relay in the timer is arranged so that both solenoids cannot be energized at one time.

A fuel pressure regulator for coke oven gas at each battery controls a butterfly valve in the main. An orifice type recording and integrating fuel gas meter measures coke oven gas for each battery. Thermometers, gages and instruments are also furnished for each battery.

Two combination coke pusher and leveler machines have the following approximate maximum operating speeds:

Unit	Ft./min.
Pusher bridge	375
Ram, forward stroke	90
Ram, retracting stroke	115
Leveler bar	130

A coal charging car with capacity for 13.3 net ton ovens operates over each battery (Fig. 3). Each car has three hoppers fitted with revolving table bottoms for delivery of coal to the ovens and mechanism for operating the coal bin gates when charging coal to the car. Each car has a bridge speed, when loaded, of 380 feet per minute, maximum; when empty, a speed of 420 feet per minute. Frames are of riveted construction, supporting the cylindrical hoppers, motors, operating cab and platform.

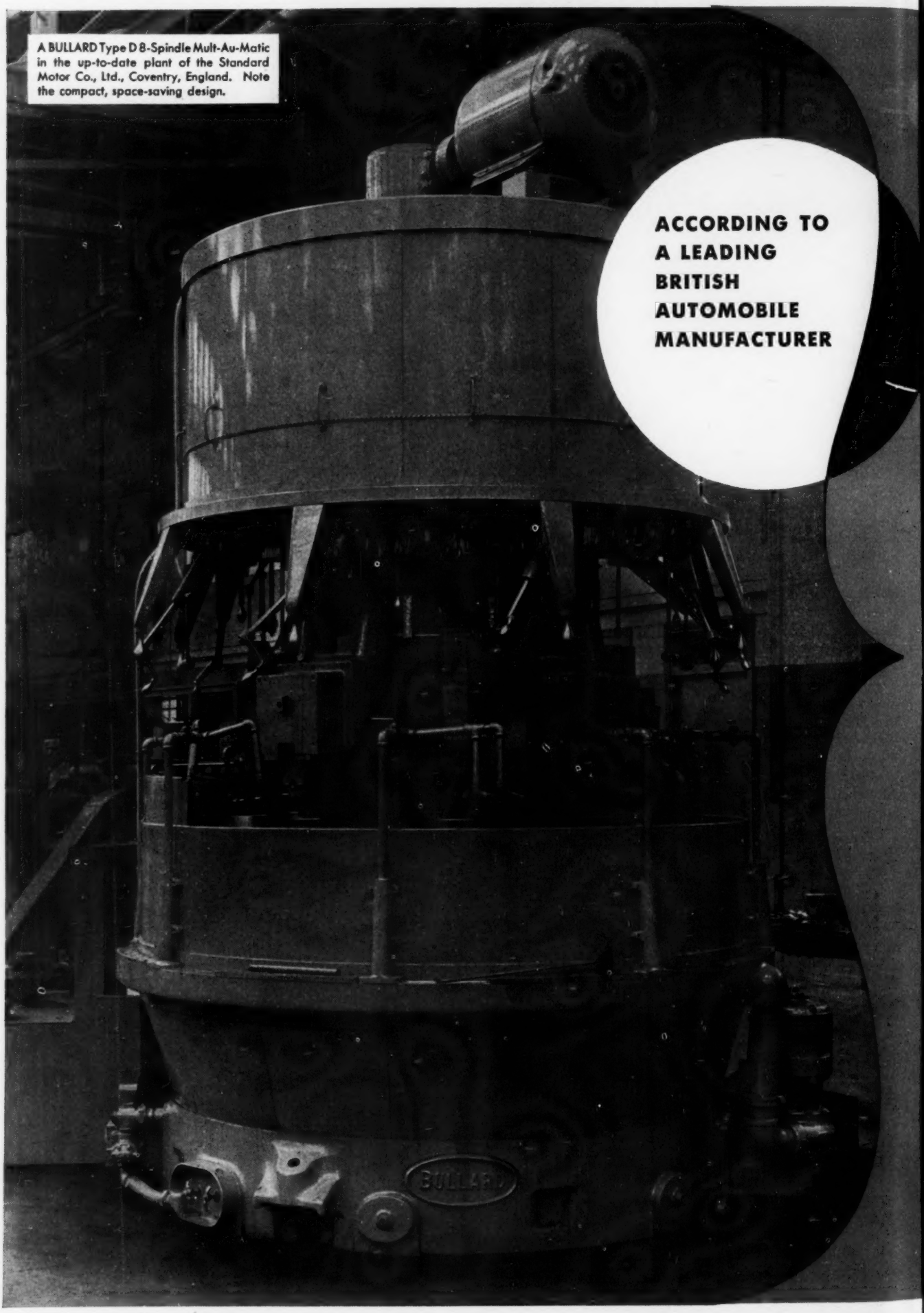
Hoppers are of welded construction, each provided with a sleeve for volumetric measurement of coal to the hopper, and an adjustable gate to control the rate at which coal is charged to the ovens. Each hopper is fitted with a cut-off gate, discharge spout and drop sleeve. The gates and sleeves are independently controlled by manually operated levers located in the cab, with auxiliary levers for raising or lowering the sleeves from the top of the battery. An electrical interlocking system is provided so that the car cannot be started when the drop sleeve is in the lowered position.

The gates of the coal bin are operated from mechanism mounted on the framework of the charging car.

Six door machines are employed, three for service on the coke side and three for service on the pusher side of the batteries. The machines are duplicates, and are of the hydraulically-operated type, with swinging heads. Each machine consists of a motor-driven underframe on which is mounted hydraulically-operated mechanism for unlatching, removing and swinging the doors 90 degrees for cleaning. Bridge of each door machine operates at a maximum speed of 300 feet per minute. Each operation of the hydraulic cylinder mechanism requires about 8 to 10 seconds.

Door extractor heads house the lifting head and carrying mechanism for compressing the springs on the doors, rotating the latch bars and lifting the doors from their seats carried on swinging arms pivotally mounted, top and bottom, in the main supporting structure. In operation, as the door is withdrawn, it is lifted and then swung 90 degrees into cleaning position. Movements of the lifting head, the extractor head and the rotating frame are by means of hydraulic cylinders operating under a maximum pressure of 750 pounds per square inch, power being provided by a double pump and combination valve unit. The cylinders are of the self-throttling type, slowing the movement of the piston at each end of the stroke.

Three 4-wheeled trailer type coke guides with retracting racks are



A BULLARD Type D 8-Spindle Mult-Au-Matic in the up-to-date plant of the Standard Motor Co., Ltd., Coventry, England. Note the compact, space-saving design.

ACCORDING TO A LEADING BRITISH AUTOMOBILE MANUFACTURER

Photographs courtesy of the *Standard Car Review*

"This one machine equals the production of twelve to fourteen capstan lathes."

From Coventry, England, comes this enthusiastic report of the Standard Motor Co., Ltd., on the BULLARD Type D Mult-Au-Matic. In the company's publication, *Standard Car Review*, the BULLARD 8-spindle machine is featured as "an excellent example of modernization of production machinery" . . . with particular emphasis on its ability to perform 12 machining operations — entirely automatically — in 2 minutes' piece time!

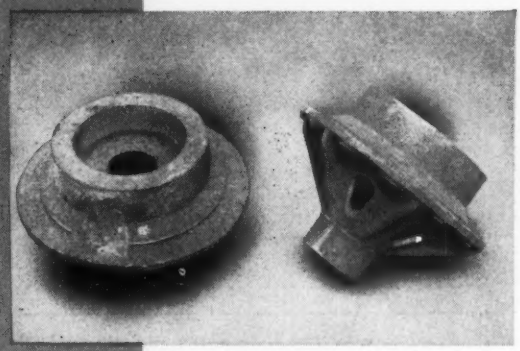
Many similar case histories show why BULLARD Mult-Au-Matics are internationally recognized as outstanding among multi-spindle manufacturing equipment . . . key factors in the present world-wide effort to increase the volume and cut the time and costs of production.

GET ALL THE DETAILS

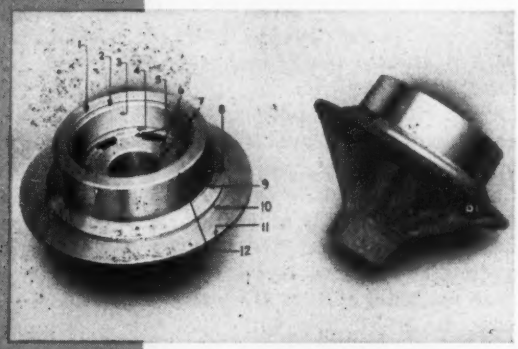
BULLARD Type D Mult-Au-Matics — made with 6 or 8 spindles in 4 sizes, for work up to 23" diameter — are built for high speed, heavy feed, tough metal, maintained accuracy. Type K is designed to handle small and medium-sized jobs in cast iron, steel and light metal alloys, at spindle speeds up to 900 rpm. Both types are equally effective on diversified schedules or as special-purpose machines for long runs. Write for facts that show how these advanced machines can lower your own manufacturing costs through greatly increased production.
THE BULLARD COMPANY, Bridgeport 2, Connecticut.

BULLARD

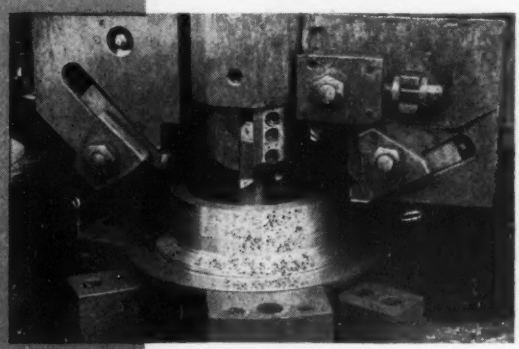
BULLARD CREATES
***NEW METHODS* TO MAKE MACHINES DO MORE**



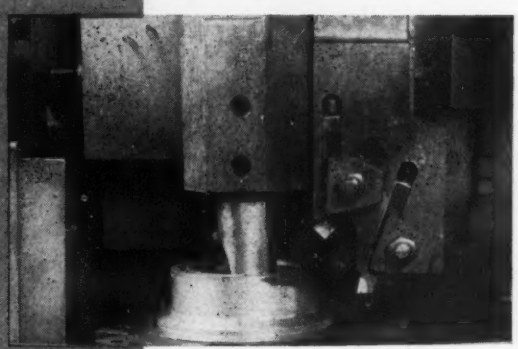
The work. A cast differential gear case, before machining.



The same casting after completing one cycle (through 7 work stations) on the BULLARD machine. Arrows indicate the 12 machined faces . . . Piece time: 2 minutes!



Close-ups of 2 of the 7 fully automatic work stations, showing several tools cutting simultaneously.



DETAILS OF OVEN DESIGN

Data	Oven Temperature Cold	Hot
Length:		
Overall, ft-in	41—6¾	42—1½
Between doors, ft-in	39—0	39—4¾
Height:		
Oven chamber, ft-in	10—0	10—1⅞
To coal line, ft-in	.....	9—1
Width:		
Pusher side, in.	17	16⅝
Coke side, in.	21	20⅝
Average, in.	19	18⅝
Taper, in	.....	4
Center to center of ovens, ft-in	.....	3—7½
Vertical heating flues, no.	29	
Content to coal line, cu. ft	555.6	
Coal charged (48 lbs./cu.ft)	13.3	
Normal coking rate, in./hr.	1.1 (16 hr., 56 min.)	
Coke producing capacity:		
Per oven/24 hrs., n.t.	12.46	
Per day, n.t.	2206	

provided. The underframe and framework of each guide for supporting the rack is of riveted construction, with rails on which the rack travels. Framework of the retracting rack is of riveted construction, with rack bars riveted to the framework. The rack has a cast-iron floor plate and is supported on four wheels. A curved angle deflector secured to the rack breaks the cake of coke as it leaves the guide. Levers keyed to a connecting shaft, with a lever for engaging a crosshead actuated by a hydraulic cylinder located on the door machine, operate the rack. The rack is interlocked with the door machine so that the latter cannot be moved unless the rack is in the retracted position.

Each coke guide is furnished with a radiation type pyrometer permitting reading of coke temperatures. Means are provided on each coke guide for mounting a portable temperature recorder which serves the three coke guides.

Coke quenching cars with a rated capacity of 10 tons of coke, have bodies 40 feet long, cast-steel side frame trucks, rolled steel wheels, self-aligning roller bearings at the journals, and two gates operated by a single motor through a speed reducer, shaft and operating arms attached to the doors (Fig. 4).

The coal bin was designed to have a net operating capacity of 3500 net tons of coal weighing 48 pounds per cubic foot, and a gross capacity of approximately 4000 tons of coal. The bin is built of reinforced concrete. Bottom hoppers are lined with hard-burned brick laid flat and curved at the valley angles. The bin is built in five bays with one row of hoppers.

Two rails form the larry car track, and a 60-ton capacity 6-section larry track scale was installed with a live rail the full length of the bin. A dial and tape recorder are located close to the inside of the bin wall near the center of the building, with means for operating from the platform of the coal charging car.

Bin gates have 24-inch square openings, and consist of five lines of three gates, with each line actuated as a unit by the motor-operated mechanism on the larry car. A heating system comprising a chamber covering the full area of the bin, heated by steam coils, is installed above the charging gates.

Supports at the center of the bin carry the driving machinery for the conveyor that delivers coal to the bin. A chute receives coal from the conveyor at the rate of 1000 tons per hour, with a fly gate splitting the stream so that half will be delivered to each of the drag conveyors which convey coal towards each end of the bin and distribute it over the entire bin.

Coke handling equipment consists of a 240-foot wharf, conveyors from the new wharf and two existing wharfs to a trunk line conveyor, coke scalping, crushing, screening and rail loading facilities, together with car haulage, sized coke surge bins, filling conveyors, motor-operated bin gates for unloading trucks, and motor operated bin gates for delivery of furnace and domestic coke to a proposed conveyor system to the blast furnace bins.

The plant is arranged to handle 8400 tons of coke per day. The 60-inch trunk conveyor has a capacity of 600 tons per hour and can handle the combined loading from the three wharfs at a rate of 200 tons per hour each. Coke from the wharfs is delivered to a common coke box from which the trunk line belt draws its load up to 600 tons per hour.

Equipment provided will scalp, crush and prepare run-of-oven coke into the following sizes:

Grade	Size, inches
Furnace	—4 to +1½
Domestic	—1½ to +¾
Pea	—¾ to +⅜
Dust	—⅜

Furnace and domestic coke are loaded to cars with loading booms. Car charging chutes are provided on all rail loading conveyors so that empty cars may be shifted into place without stopping the conveyors.

All motors in the screening station are under the control of the operator from a station where he has a clear view of all car loading.

Motor Line Adopted for Mill Materials Handling

Features of new 600 series mill motors for materials handling applications were the subject of a paper presented by C. B. Hathaway, Westinghouse Motor Division, Buffalo, at midwinter meeting of American Institute of Electrical Engineers in Pittsburgh. This line of motors was adopted last summer as standard for the industry by Association of Iron and Steel Engineers. At the same time root mean square ratings for motors operating intermittently were abandoned and only 1 and 5 hour continuous ratings for enclosed motors and 1 hour and continuous ratings for self-ventilated, open-protected motors were retained.

Complete redesign of new motor does not permit interchange of many parts with those of the old line, but shaft extensions and all other dimensions which affect mounting of motors remain unchanged for a given size frame. Mounts for all motor ratings except 5 horsepower are reduced one frame size. Consequently, an old motor which is overloaded can be replaced with one of the next higher horsepower rating.

New line is supplied with and without back axles of same dimensions as the old. Gears for old motors provided a 14½ degree involute shape of tooth while those of new motors offer a 20-degree stub tooth. Increase of strength of teeth compensates somewhat for increased loading on a given size gear and pinion.

Axial ducts are provided in new armatures to carry away heat at a fast rate. An opening is provided in lower frame half directly under commutator for introduction of air where forced ventilation is desired.

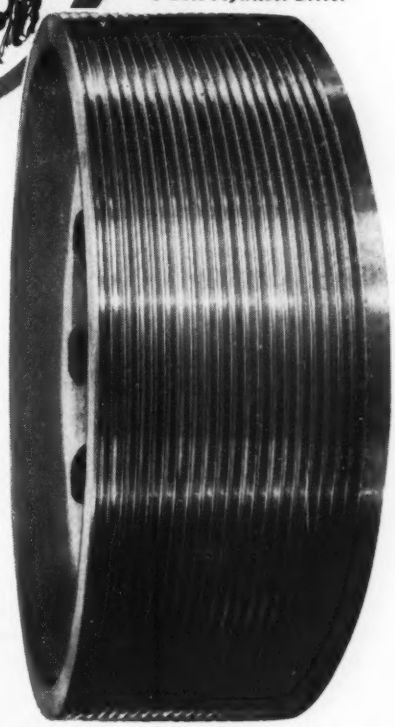
—o—

Reports prepared by American and German researchers containing details of annealing experiments conducted in United States and Germany in quest for better steel for specific war purposes are available from Office of Technical Services, Department of Commerece, Washington. Several of them are written in German, and one, prepared by a British industrial intelligence team, is based on investigations of operations of 11 German steel plants.

GIANT STEEL CASTINGS *and* CUT GEARS *by* NE

Ajax Super Tube Upsetter with Neloy Spur Gear and Pinion and V Belt Flywheel Drive.

V Belt Flywheel Drive.



VITAL PARTS IN DRIVE OF THIS 580,000 lb. AJAX SUPER TUBE UPSETTER

THE gear, pinion, V-belt flywheel drive for clutch assembly of this giant production machine were cast and machined at National-Erie. The gear is .40-.50 carbon steel, 127 inch diameter with 14 inch face. The pinion is Neloy alloy steel; rough turned, heat treated and hardened; finish machined . . . then the teeth are flame hardened. The V-belt flywheel drive is .40-.50 carbon steel, rough weight 25,640 pounds.

This drive mechanism is typical of routine at National-Erie Corporation. Here under one control and with one responsibility from raw materials to finished products, gears and castings of Neloy and Neloy Moly steels are turned out to your specifications for dependable service in the machines of industry. Consult with our engineers . . . let us help you in meeting your gear and casting requirements.

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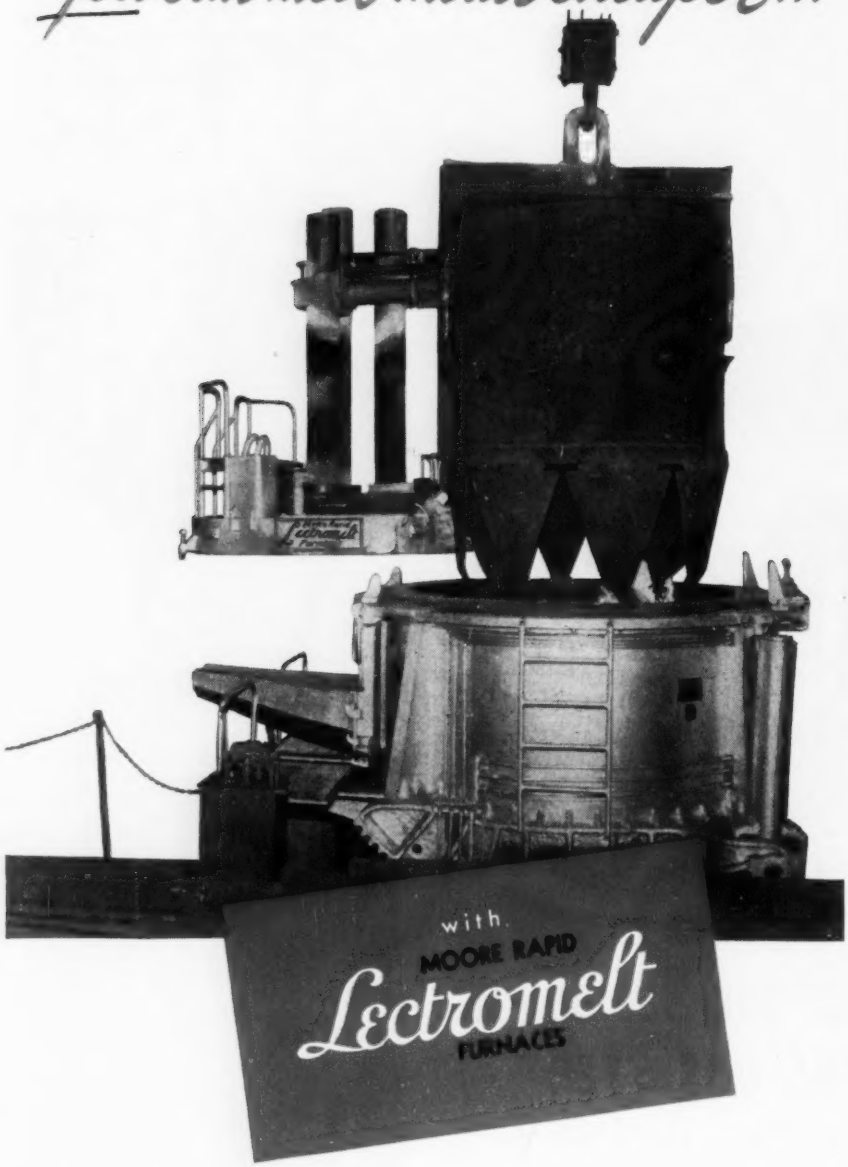

You can watch your metal melting costs per ton go down when you change to a top-charging Lectromelt furnace. Lectromelt furnaces cut the down time between heats and reduce power consumption per ton. The special patented counter-balanced electrode arm precision control allows sure regulation of each heat, reducing waste and cutting electrode consumption.

Lectromelt furnaces are made in capacities ranging from 100 tons to 250 pounds. For complete information on how you can profit by changing to Lectromelt, write today.

Manufactured in

ENGLAND	Birlec, Ltd., Birmingham
FRANCE	Stein et Roubaix, Paris
SPAIN	General Electrica Espanola, Bilboa
BELGIUM	S. A. Belge Stein et Roubaix, Bressoux-Liege

PITTSBURGH LECTROMELT FURNACE CORPORATION

PITTSBURGH 30, PENNA.

Spot Welding

(*Continued from Page* 69)

physical properties of the welds was established for all thicknesses. Since the thinner sheets were quenched to their maximum hardness a martensitic structure was obtained. By direct application of metallographic knowledge, an 1150° F anneal serves in this case not only as the common stress relief treatment upon the weld and the surrounding volume of metal, but it is also a nearly ideal temperature for the transformation of the quenched into the tempered martensitic condition.

Use of this subcritical treatment tends to lower the normal hardness of the nominally hot rolled metal to only a slight degree, and of the cold rolled metal to a considerable extent. A striking effect of this treatment was in the reduction of the hardness of the quenched weld ingot in the higher carbon steels.

Use of an above-critical temperature, as 1420° F for the higher carbon steels lowered the hardness of all zones even more. These welds for the thinner sheets were nearly always less strong than those annealed or tempered at 1150° F.

For the low carbon compositions both heat treatments resulted in welds of lowered strength, for the tension-shear type of loading for all thicknesses. These strengths were, on the other hand, increased up to two and one-half times for the higher carbon analyses by the same treatments. Strengths in direct-tension were increased up to 100 times by heat treatment of the high carbon steels.

By plotting the ratio of the heat-treated tension-shear strength to that of the "as welded" strength against carbon content, for each thickness tested in the same manner it was possible precisely to determine the point were the ratio of one was obtained for each thickness. This is the dividing line between the conditions where a tempering heat treatment lowers the composite strength on the weld by reducing both the ingot and material strengths, and the condition where the composite strength is improved by the application of a tempering treatment upon the hardened weld and the immediately surrounding metal.

By plotting the carbon-thickness relations for which the ratio of one was obtained from the tension-shear tests, as in Fig. 10, the upper limit of carbon dividing the ductile or "foolproof" analyses from the brittle analyses was established across the

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thickness range. This method of approach cannot be used for the cold rolled steels because of the influence of the heat treatment upon the strength of the unaffected stock and of the known interrelationships between weld tension-shear strength and material strengths.

Influence of Pre-welded Tensile Properties—It has been shown in previous investigations that the prewelded sheet strength exerts a pronounced influence upon the final weld properties. The present investigation, which included cold rolled steels up to one-half inch in thickness, provided additional data upon this phenomena. After making due allowances for the carbon content, all welds in the cold rolled steel were stronger when loaded in tension-shear than those in the hot rolled materials.

Strength when loaded in the conventional direct-tension manner was, on the other hand, found to be relatively low, particularly for thicknesses of three-sixteenth inch and less. This reduction in actual strength provided a tension to shear or ductility ratio of only 0.167 for a ⅛-inch thick 0.174 carbon steel, and 0.18 for a steel containing 0.15 per cent carbon.

When an "as welded" cold rolled steel spot weld, for about the same composition, is loaded in direct tension the stress conditions are apparently entirely different. After the initial taking up of the slack in the testing system the deformation of two stages begins. Because of the higher elastic and plastic strengths of the unwelded and unheated material there is probably little or no local redistribution of the applied load at the weld edge and consequently there is no falling off in the rate of application of the stress at the hardened weld periphery.

Leading weld edge and volume of adjoining metal is therefore stressed at the conclusion of the second loading stage to some higher unit value of undetermined magnitude, which is either above the strength of the metal at that point or which results in a deformation beyond its ability to withstand that movement. In either event failure occurs which progresses rapidly acress the entire weld interface before either a high load or deflection is reached.

For this type of loading, high strengths cannot be obtained unless the specimen has a capacity for withstanding deformation under the notch conditions involved. The application of either the furnace tempering or above critical annealing temperature to these cold rolled steel welds resulted in the changes of hardness shown in Fig. 10 and after such treatment there was little dissimilarity between the direct-tension deflection diagrams for the hot and initially cold rolled steels.

A welded joint may be brittle because of either an unsuitable quench and material composition combination or an unsuitable quench and material prewelded strength combination. For a given severe quench rate the same composition may provide a ductile weld in one case and a brittle weld in the second case, depending upon the point magnitude of the imposed stress, which in turn is influenced by the type of loading and the properties of the unwelded metal. Preannealing of the cold rolled low carbon steel stock prior to welding results in the production of ductile welds, because while the quench rates

TIN PLATE "DOUBLING" ....*in can fabricating eliminated by simple magnet*

Sheets become like poles and repel each other when magnet is placed horizontally at their edges. Reduced air blast completes separation

PRODUCTION snarling "doubles" which formerly cost container manufacturers hundreds of thousands of dollars are eliminated by the use of a simple magnet. This problem had long plagued the canning industry because tin plated sheets tend to adhere as the result of a necessary fine film of oil on the sheets.

Air blast separation used in the past frequently failed to separate the sheets, and doubles were fed into coating units and can fabricating machinery. This sticking sometimes caused cracked dies and more often required time consuming manual separation and refeeding.

Called in as an engineering consultant on the job Ray Brunner, Jones & Laughlin Steel Corp. development engineer, found the solution when he recalled the peculiar repelling properties induced by a magnetic field from previous experiments in the tin plate mill at the Aliquippa works in Pittsburgh.

Magnetic preseparator is installed on feeder machinery at one end of the stack of tin plates. A magnetic field causes the sheets to repel each other with sufficient force to spread them.

To complete the separation, a reduced air blast is used. The sheets are then picked up one by one and fed either manually or automatically.

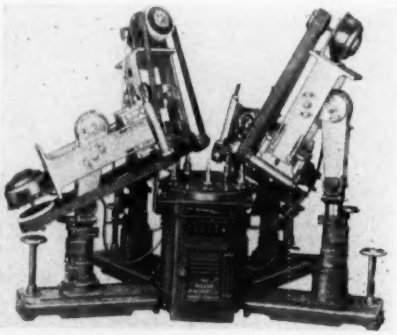
New Products and Equipment

Additional information on the new products and equipment described on this and succeeding pages may be obtained, without obligation, by checking appropriate numbers on the cards following page 118

1. Abrasive Belt Head

Adaptable to most types of Packer-Matics now in use, an abrasive belt head for automatic polishing and buffing is announced by Packer Machine Co., Meriden, Conn. This interchangeable head permits various types of wheel applications as well as the use of abrasive belts.

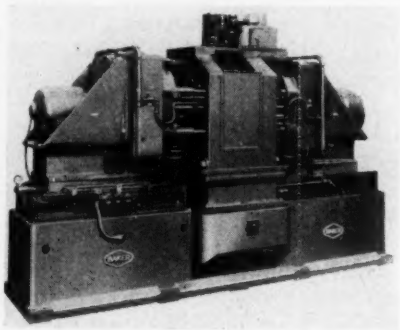
Mounting of unit is standardized. Machines can handle changes in prod-



uct design without necessitating a change in the equipment. Flexibility of the abrasive belt heads permits single operating automatic buffing and polishing of odd-shaped pieces. Head will accommodate use of buffs, polishing, tampico and wire wheels as well as an abrasive belt.

2. Horizontal Machine

Baker Brothers Inc., Toledo, O., is manufacturing a new two-way horizontal machine for the high production machining of connecting rods and caps. The 6-station trunion type

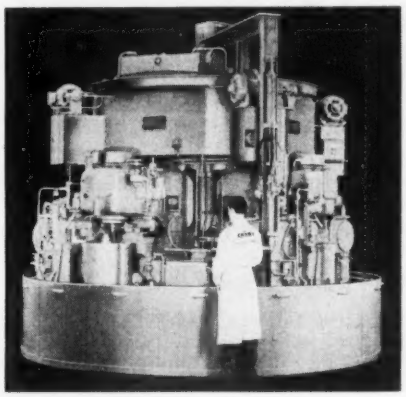


power index fixture of the special floor type machine is arranged to clamp one rod and cap at each station. Two model 15 x 16 hydraulic feed saddle units are utilized.

As illustrated, right unit is equipped with a 20 spindle fixed center multiple head, assembled with a self contained lubricant pump and driven by a 10 horsepower motor. Left unit drives a 12-spindle head, powered by a 7½-horsepower motor. Unit has high rate of rapid traverse and saddle feed and may be mounted in horizontal, vertical or angular planes. Hydraulic power is provided for each of the saddle units by a separate variable delivery portable pump-sump unit mounted on casters.

3. Milling Machine

Precision bearings, large flywheels on cutter spindles, preloaded work spindles, and climb milling with high speed steel hobs are responsible for cutting speed of 300 surface feet per minute in a 4-station, continuous cycle milling machine developed by



Cross Co., Detroit 7, Mich. Work is automatically positioned with cutter by means of rapid power traverse. Four pieces of work are finished with each revolution of machine.

Rough and finish cuts are taken at same chucking to provide uniform stock for finishing. Infeed, outfeed and taper are cam controlled. Each of four stations is an independent unit insulated from external vibration with spring suspension mounting.

4. Electric Tow Unit

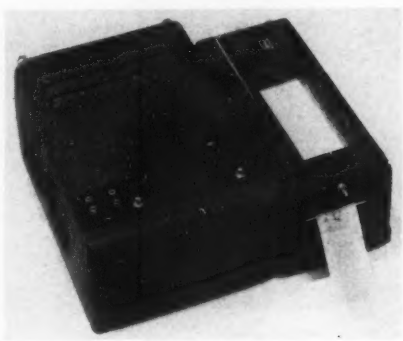
Efficient as a time and labor saver is the Electric Pony Express tow unit, made by Rocky Mountain Steel Products Inc., 1365 Wall St., Los Angeles 15, Calif., which may be operated from either side through dual controls by an operator walking alongside as well as from the conventional riding position. Trailers may be spotted and loaded without the operator getting on and off the vehicle.

Tow unit weighs 1595 pounds, has an overall length of 77 inches and

turns in a radius of 58 inches. It has an automatic hitch. Other features include optional seat or back rest, optional maximum speed of 6 or 8½-miles per hour with 24 or 32 volt battery and four speeds forward and reverse.

5. Strain Analyzer

Either static or dynamic strains up to 100 cycles per second may be recorded by the BL-310 amplifier, when used by the magnetic direct inking oscillograph to make a direct recording strain analyzer, both units made by Brush Development Co.,



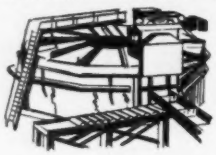
3405 Perkins Ave., Cleveland 14, O. Direction as well as magnitude of the measured strain can be read from the chart.

Amplifier contains two legs of the Wheatstone bridge network, the third and fourth legs being connected externally by the user. One is the active gage and the other for sensitivity doubling or temperature com-

GASMACO INDUSTRIAL FURNACES

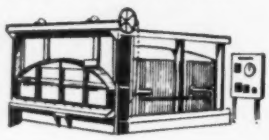
OIL or GAS FIRED for ALL TYPES of HEAT TREATING

DOUGHNUT ROTARY HEARTH FURNACES



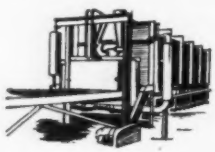
This particular furnace has baffle walls to shield controlled heating zones from high temperatures of the combustion zone, providing more accurate, uniform heating. Special insulation provides faster heating with minimum wall losses for fuel economy. Automatic charging and discharging machinery reduces labor requirements.

BOX TYPE FURNACES



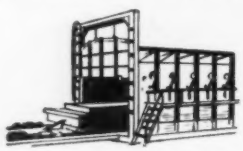
Built to specification for sintering, brazing, bright forging, annealing, hardening and draw. Designed to meet the increasing need for prepared atmospheres which will discharge material free from scale or surface decarburization. Furnished in continuous, semi-continuous or batch type for fuel fired furnaces.

RADIANT TUBE FIRED ROLLER HEARTH FURNACES



An exclusive feature of these furnaces is the Carbofrax* Tubes and Rollers which permit firing in excess of 2500° F, with fewer replacements. Complete control of the furnace atmosphere is provided. Annealing is accomplished without decarburization or scale in simple, inexpensive car, pusher, conveyor, chain or roller hearth type furnaces.

CONTROLLED ATMOSPHERE CAR TYPE FURNACES



Simply designed for long, trouble-free service and little or no maintenance. Equipped to handle material of nearly any size, shape and height. Ideally suited for heat treating, spheroidizing and annealing applications.

* "CARBOFRAX" is a registered trade-mark indicating manufacture by the Carborundum Co.

All GASMACO furnaces are individually designed to fit your particular furnace requirements to assure maximum operating economy. It will pay you to investigate these furnaces for your next heat-treating job.

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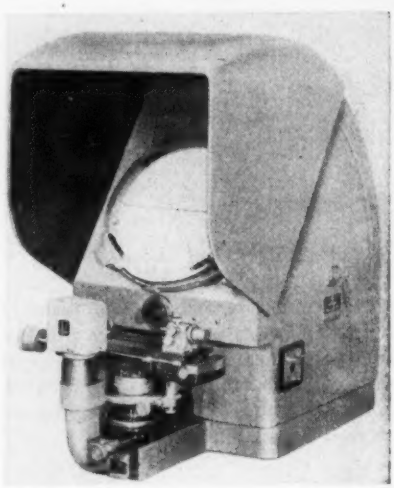
pensation. Analyzer is readily calibrated for individual gages so that strain can be read directly in microinches per inch from the chart deflection. Although primarily intended for use with the SR-4 120 ohm strain gage, it is also applicable for use with any resistance sensitive pickup. It can be used to record pressures, temperatures, accelerations, forces, etc., providing equipment is properly calibrated.

6. Optical Comparators

Optical comparators in two basic models with different table assembly combinations are announced by Jones & Lamson Machine Co., Springfield, Vt. Model BC-7 offers a choice of three table assembly combinations in



12, 14 and 16 inch lengths. Objects up to 3-inches in diameter and 11-inches between centers can be inspected by comparison. Range of magnifications in this model is from 5 to 125.

Model BC-14, illustrated, with a screen 14 inches in diameter provides a larger lens field and screen area than smaller model, and has four table assembly combinations available. Magnifications in this model range from 10 to 100.

7. Automatic Lathe

Heavy and rigid construction of the automatic hydraulic feed lathe designed by Snyder Tool & Engineering Co., 3400 E. Lafayette St., Detroit, Mich., permits maintenance of high speeds and feeds with long tool life. Machines' design permits addition of a center drive unit and an overhead facing slide at any time. Hydraulic feeds and wide adjustments on all sides permit a considerable range of parts to be machined with minimum changeover time.

Lathe is equipped with two turning

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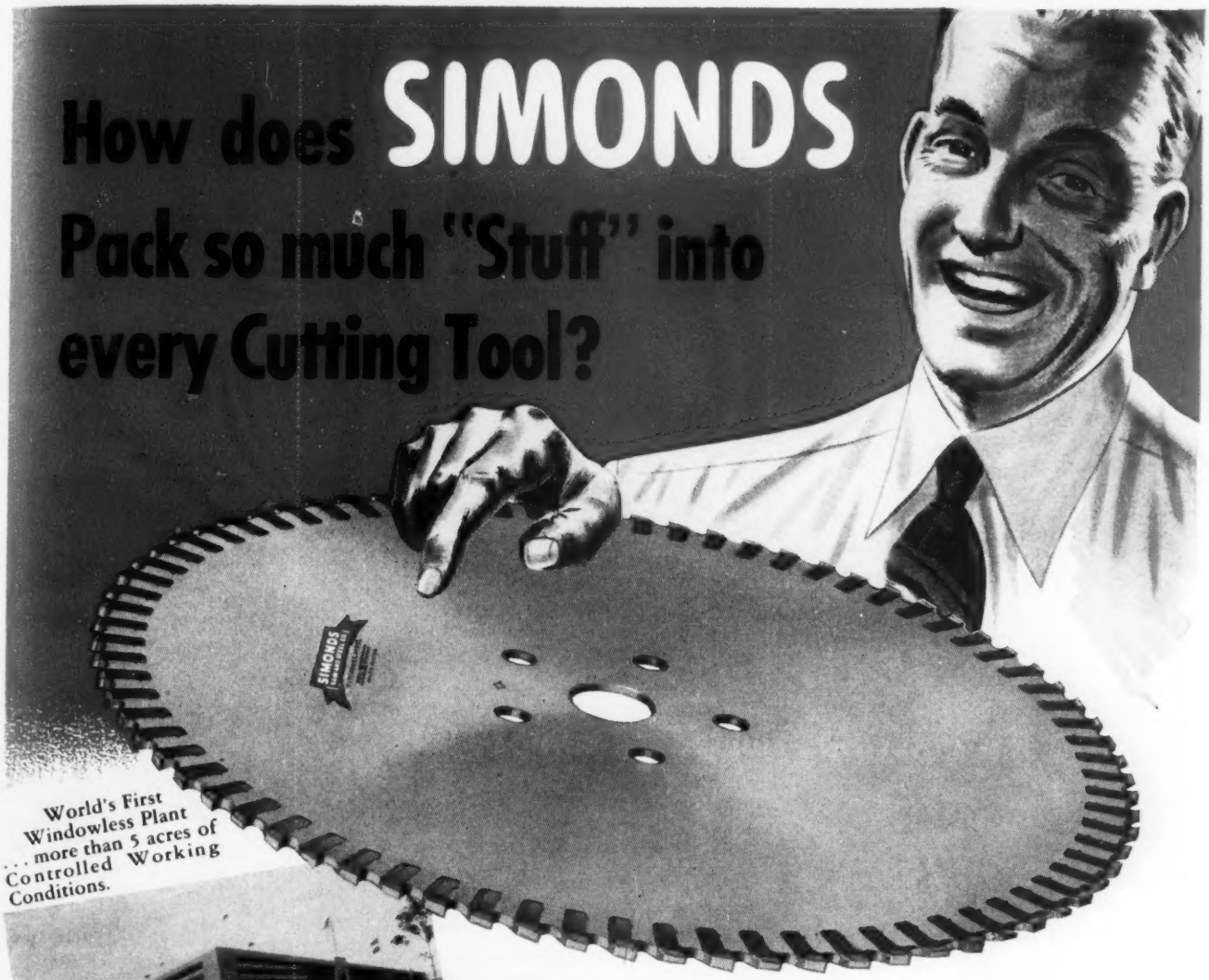

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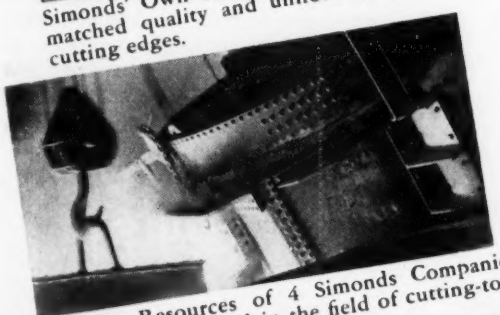
Simonds' Own Steel Mill guarantees the unmatched quality and uniformity of Simonds cutting edges.



Co-operative Resources of 4 Simonds Companies assure service unequalled in the field of cutting-tool manufacture.

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to this Often-Asked Question about SIMONDS SAWS, KNIVES and FILES

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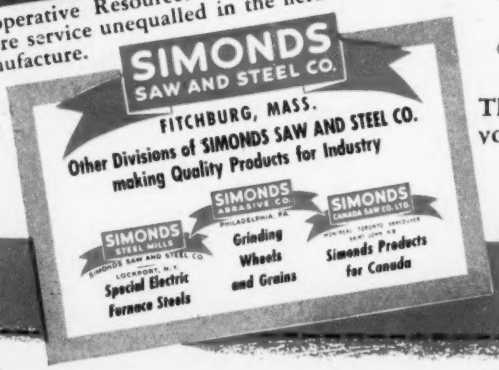
2. **World's First Windowless Plant** . . . air, light, sound completely controlled for better work, higher product-quality, faster delivery.
3. **Simonds Steel Mill** . . . Modern electric furnaces, under close laboratory control, pour all Simonds special cutting-tool steels.
4. **Simonds Own "Sharpeners"** . . . Simonds organization includes a top producer of grinding wheels . . . part of the secret of Simonds famous "Mirror Finish."
5. **Simonds Research:** New metals, methods, and cutting tools . . . these come *first* from Simonds.
6. **Simonds 4-Company Organization:** All quality controlled from raw material to *you.*

That's why Simonds Tools cut *your* cutting costs. Order from your Distributor.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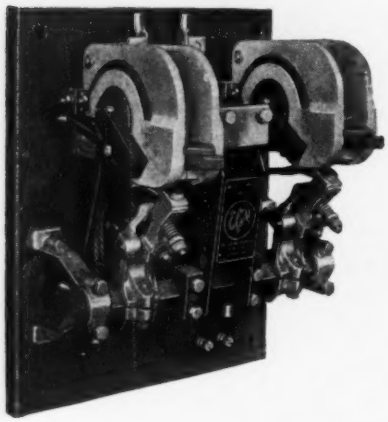
OF CONSISTENT CUTTING EFFICIENCY

carriages, two facing slides and hydraulically operated quill type tailstock. All feeds are hydraulic and are adjustable by dials for each attachment. Spindle speeds are controlled by easily accessible pickoff gears. All moving parts are automatically lubricated.

8. High Frequency Contactors

Contactors for opening or closing of power circuits with frequencies up to 10,000 cycles per second for heating or hardening operations are being manufactured by Electric Controller & Mfg. Co., Cleveland 4, O. The type LZ contactors are of double-pole con-



struction with one pole used to open each side of line. Blow out coils are not subject to excessive heating from eddy currents but are introduced in circuit at time contactor starts to open to interrupt flow of current.

One end of blow out coil is connected to arcing plate located at front of arc shields and other end is connected in conventional manner. As contacts start to separate, arc is transferred to circular guard over blow out coil to arcing plate. Blow out coil is thus automatically inserted and arc is extinguished quickly under control of Line-Arc principle.

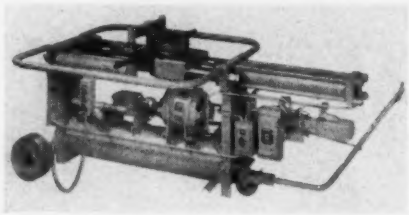
9. Drain Truck

Engineered by Lewis-Shepard Products Inc., 284 Walnut St., Watertown 72, Mass., as an addition to their line of special purpose floor trucks, is a drain bottom truck made either of 18-8 nickel stainless steel or regular 1020 hot rolled steel. Box section may be cleaned of fluids by flushing with a hose. Corrugated bottom drains from sides of truck to avoid flowing liquids over running gear.

Truck is equipped with end bumpers. Base is of heavy hot dip galvanized steel. Wheels and casters turn on roller bearings. Steel wheels are standard, but rubber tired or Celeron wheels are available.

10. Bending Machine

Addition of the No. 1402 ram type machine to its line of bending macines is announced by Wallace Supplies Mfg. Co., 1300 Diversey Parkway, Chicago 14, Ill. Simplified method of ram bending requires no repositioning of dies or relocating of pipe



when bending up to 180 degrees in one continuous operation.

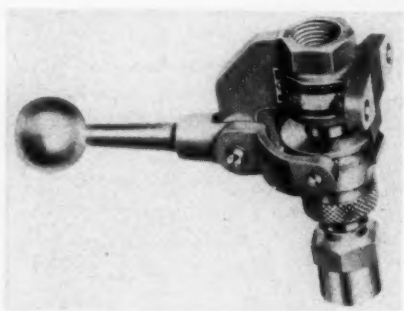
Machine is equipped with standard die equipment for bending up to 2-inch extra heavy weight steel pipe. Special dies are offered for angle iron, channels, reinforcing bars, flat bars, etc

11. High Speed Taps

Both standard and special high speed ground taps comprise the new line manufactured by Sheffield Corp., Dayton 1, O. Heat treated steels give them uniform extra strength and hardness without brittleness. Delivery from stock can be made on standard three and four-fluted and spiral pointed hand taps, standard and spiral pointed machine screw taps and pipe taps with American National pipe taper and straight.

12. Air Valves

Announced by C. B. Hunt & Son Inc., Salem, O., are 1291-N3 3-way, neutral position hand operated air control valves. They have a forged



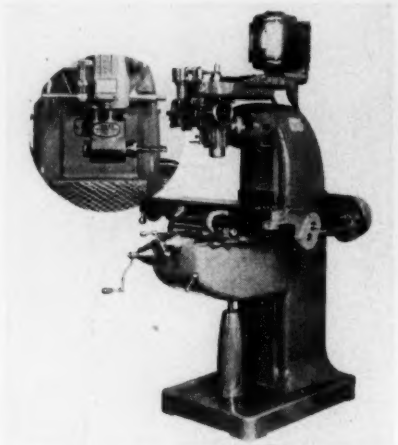
bronze handle, a brass sleeve, stainless steel body and adapter and a forged bronze head with flat spring which holds handle in on, off, hold or neutral positions.

Valves are designed for use with single acting air cylinders. They are made with 3/8 and 1/2-inch pipe sizes for air pressure up to 250 pounds per square inch.

13. Vertical Miller

Power is delivered to the table of the model 50 high speed vertical milling machine developed by Index Machine Co., 543 North Mechanic St., Jackson, Mich., by a quick change full-geared table feed mechanism, increasing the machine's precision and sensitive operation. Machine has a wide range of working capacity, being used for vertical and horizontal milling as well as for boring and drilling.

Table size is 8 x 34 inches with three table speeds which can be



varied indefinitely and 12 cutter speeds up to 2400 revolutions per minute. Spindle downfeed and table feed are automatic. Machine has a right angle milling head which handles horizontal milling operations of every type, including boring and drilling. Head makes changeover from vertical to angle milling in a few seconds without disturbing work.

14. Automatic Press

Completely automatic with double roll feed end scrap shear synchronized so as to feed and trim predetermined lengths, the new No. 6290-D high production press, developed by E. W. Bliss Co., 450 Amsterdam Ave., Detroit 2, Mich., has a capacity of 300 tons. Used to form floor panel reinforcements in eight steps of a progressive die, it can make 45 strokes per minute.

Frame construction is of stress relieved steel weldments. It has single gearing with single end drive. Press gibbing is square with bronze lining

(For more information, use the card following page 118.)

When Performance is Measured in R.P.M.

. . . give the job to precision steel castings that conform accurately to specifications and blueprints.

This turbine runner—a Birdsboro Precision Steel Casting made by the Randupson Process—came out of the mold true-to-pattern, with a clean skin and smooth, sharp contours that cut frictional losses to the minimum. And its uniform-grained structure gave it a start on a long life of trouble free operation.

If precision in steel castings is what you are looking for, we'll be looking for a call from you. Put Birdsboro's experience and facilities to work on your problem.

BIRDSBORO STEEL CASTINGS

BIRDSBORO STEEL FOUNDRY & MACHINE COMPANY • BIRDSBORO, PA.

BUILDERS OF: Steel Castings • Steel Mill Equipment • Hydraulic Presses • Rolls • Special Machinery • Crushing Machinery

BIRDSBORO
STEEL CASTINGS

O-1-47

and bed is arranged to receive die cushions. Distance between uprights is 84 inches and stroke of slide is 6 inches.

15. Welding Torch

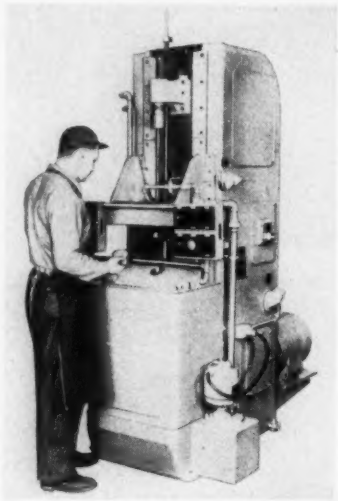
Welding jobs from thinnest sheet metal to metal 1-1/2-inches in thickness are possible with the Airco 800 oxyacetylene torch announced by Air Reduction Sales Co., 60 East 42nd Street, New York 17, N. Y. The torch weighs 1-1/2 pounds and is 11-1/2 inches long and has a capacity for operating single flame tips number 0 to 13 inclusive as well as multiflame tips up to number 15.

A smaller model Airco 700 is used with welding tip assemblies in sizes 0 to 10 inclusive. Cutting attachments are available for both torches.

16. Broaching Machine

Pushbutton operated electrical controls, arranged to complete one full cycle on semiautomatic operation are featured on the VP-2-8-24 vertical pull-up hydraulic broaching machine, built by American Broach & Machine Co., Ann Arbor, Mich. Provision can be made to stop machine at end of broaching stroke for step-cycle operation.

Designed for high production internal broaching of small parts, the



machine may be provided with multiple tooling for even greater production by increasing the number of broaching stations. Addition of a built-in hydraulic interlocked loading slide and a magazine type loading unit makes it fully automatic. Normal broaching capacity is 8 tons, maximum 10 tons. Stroke is 24 inches with a variable speed of 15 to 24 feet per minute.

17. Flame Failure Unit

Instantaneous oil burner shutdown is effected in case of flame failure by the photoelectric scanner type 45PH5, developed by Combustion Control Corp., 77 Broadway, Cambridge 42, Mass. Unit is used in combination with control type 24QJ5 to provide operating protection of the oil burner installation and with programmer type 24PJ8 if starting protection and automatic ignition are required.

Scanner consists of phototube and vacuum tube amplifier housed in a dust tight aluminum case, mounted so that it has a clear view of the oil flame.

18. Annunciator

Type ANF audible visual annunciator currently manufactured by Autocall Co., Shelby, O., is a refinement of a previous design. Closing of a trouble contact on equipment under supervision illuminates proper desig-

(For more information, use the card following page 118.)

A Complete Warehouse Service for...
SHEETS • PLATES
STRIP • STAINLESS STEEL
TIN PLATE • BARS • SHAPES
WIRE PRODUCTS • ALLOYS
Adequate Stocks!
Prompt Shipment!
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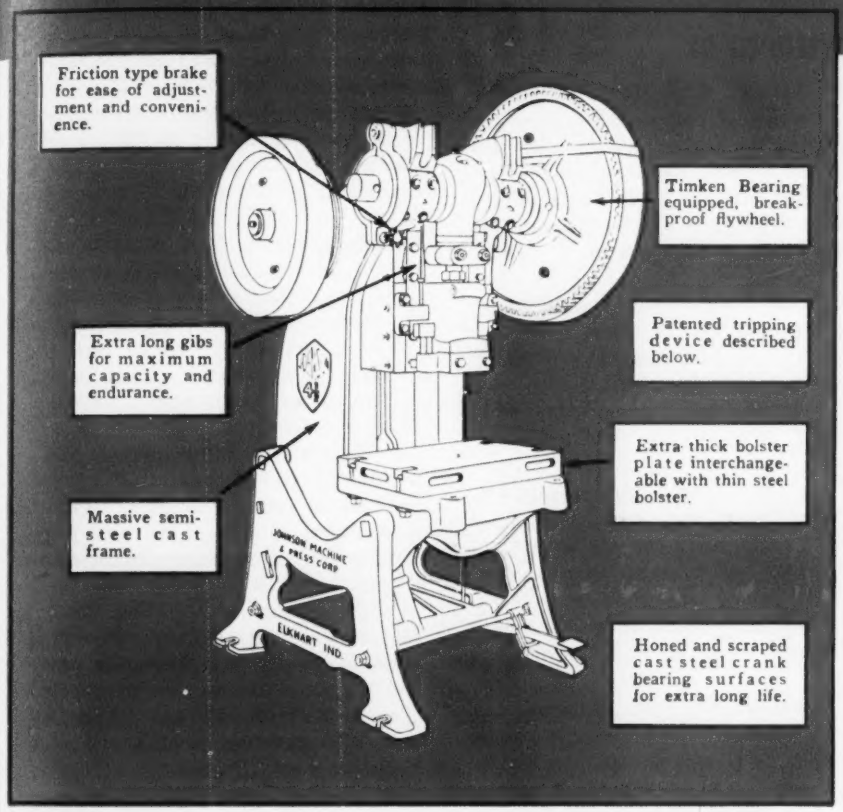
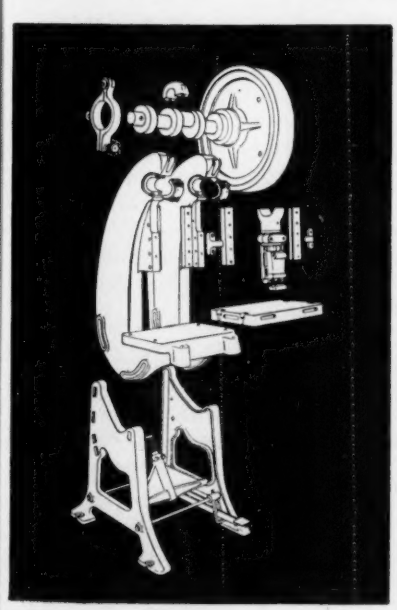
Tri-Boro Steel Supply Co., Inc.

FOR EXTRA SAFETY AND ADAPTABILITY IN 16 TO 90 TON *INCLINABLE POWER PRESSES...* SEE THE SPECIFICATIONS on a *Johnson*


Friction type brake for ease of adjustment and convenience.
Timken Bearing equipped, breakproof flywheel.
Patented tripping device described below.
Extra long gibs for maximum capacity and endurance.
Extra thick bolster plate interchangeable with thin steel bolster.
Massive semi-steel cast frame.
Honed and scraped cast steel crank bearing surfaces for extra long life.
JOHNSON MACHINE & PRESS CORP.
ELKHART IND.

Johnson presses represent many years of practical experience in designing and manufacturing punch presses. They are adaptable for blanking, piercing, forming, drawing, assembly, notching, sizing, trimming, coining and many other metalworking operations.

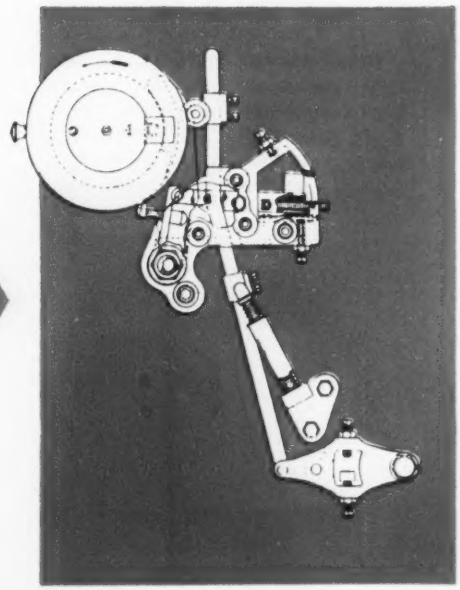
CHOOSE JOHNSON FOR THESE SPECIAL FEATURES!



MAINTENANCE MADE EASY This exploded view of the Johnson Inclinable Power Press shows the simple, sturdy construction of each part and the ease with which it may be assembled when repairs are needed.

EXCLUSIVE NEW TRIPPING DEVICE It is a positive non-repeat mechanism. If one of the two activating springs break, the other spring operates the trip. If both should break, the clutch automatically disengages.

Springs are easily replaced in 30 seconds without stopping machine.



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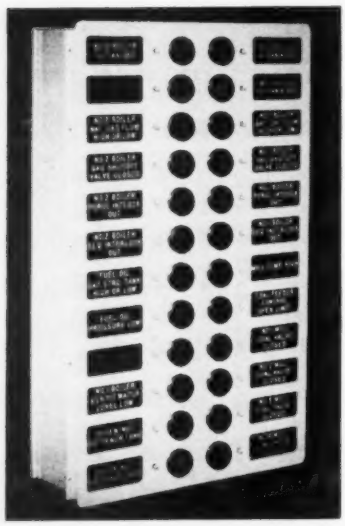
JOHNSON *Machine and Press Corp.*

420 WEST INDIANA AVE. ELKHART, IND.

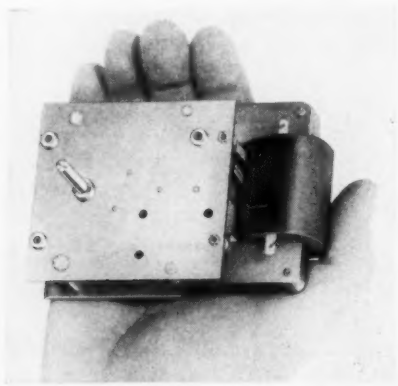
nation on face of annunciator and causes a remote audible alarm to sound until it is silenced by an acknowledging button. One of the features of this model is that silencing alarm for one trouble does not prevent operation of same alarm in case of additional trouble.

Operation of acknowledging switch to silence alarm illuminates pilot light adjacent to designation. Illumination of designation will continue until equipment under supervision restores to normal and trouble contact opens. Annunciator may be specified for alternating or direct current operation with voltages depending upon requirements.



19. High Torque Motor

Small enough to fit in the hand, a new fractional horsepower motor of high torque capacity is announced by T. C. Smith Mfg. Co., 920 Washington St., Springfield, Ill. It has a stalling torque of 75 ounce-inches at rated voltage. With 20 watts input at 115 volts, 60 cycle alternating current, the no load speed is 20 revolutions per minute on the output shaft. Lower input wattages are available at correspondingly lower stalling torques.



Motor is constructed of aluminum and has a built-in gear train. Various gear ratios can be supplied. Bearings are of oil impregnated powdered metal. A magnetic clutch prevents any overtravel of the output shaft with the de-energizing of the motor.

DEVELOPED BY . . .

20. Jacuzzi Bros. Inc., St. Louis, Mo., series of boiler feed pumps for pumping hot water and for other installations requiring high water pressure. Multistage centrifugal pumps are of vertical design varying in size from 1/2 to 20 horsepower.

21. Acme Aluminum Co., Mansfield, O., Hydrolock hose connections for service with air, steam, hot water, coolants, etc. Features include ease in connecting and disconnecting, tight seating, positive control of pressures.

22. Monroe Auto Equipment Co., Monroe, Mich., two types of tubular steel tiering posts for use with Monroe 8-way pallets when used for storage of boxed materials and crushable items. Between pallet clearance may be 30, 36 or 42 inches.

23. Connecticut Hard Rubber Co., New Haven, Conn., silicone rubber sponge for sealing and vibration dampening. It withstands temperatures in range from minus 70°F to as high as 500°F.

24. Sundstrand Machine Tool Co., Rockford, Ill., a constant volume pump for 1000 pounds per square inch service. It is applicable to materials handling equipment, industrial heating units, etc.

25. Pratt Mfg. Co. Inc., Fairmount, Ind., Spiralcool backing pad for disk sanders, made of layers of rubber reinforced with fabric and bonded to a slotted iron hub. Slots in hub force air through to back of disk, keeping it cool.

26. Victor Equipment Co., San Francisco, Calif., model 3401 four-in-one torch for light brazing or soldering operations. It may be used with acetylene, natural, city or liquefied petroleum gas in combination with compressed air or oxygen.

27. Hanson-Van Winkle-Munning Co., Matawan, N. J., satin finish hanger brushes, each tuft of which is supplied with an S-hook to provide the swing action required for a smooth satin finish. It may be run in either direction.

28. Waterman Engineering Co., Evanston, Ill., compactly built solenoid valve for hydraulic systems and handling of noncorrosive fluids. Maximum working pressure is 3000 pounds per square inch. Electrical requirements are 6, 12, 24, or 36 volts.

29. Adel Precision Products Corp., Burbank, Calif., series of hydraulic 4-way selector valves for 1000 pounds per square inch pressure for control of one double acting or two single acting cylinders. A variety of types are made.

30. Spraying Systems Co., Chicago 24, Ill., spring guard which protects the large deflector face of company's Flatjet washing nozzles subject to accidental bumping. Nozzle provides a sharp, hard hitting spray for washing floors and machinery.

31. Falk Corp., Milwaukee 8, Wis., the backstop for preventing reverse rotation on conveyor drives, elevator head shafts, winches, etc. Its gripping action takes place the moment forward rotation ceases.

32. General Detroit Corp., Detroit 7, Mich., Safe Guard combustible waste cans in pedal and manually operated models of 7, 9, 12 and 15 gallon sizes. Construction is of heavy gage rustproof zinc-coated steel.

33. Sterling Tool Product Co., Chicago 22, Ill., portable electric sander with side housing fenders to prevent scuffing in close quarters. Accessories include an air scoop for dust protection and an auxiliary handle or knob.

34. Saval Co., Los Angeles 11, Calif., No. 8298 1½-inch 4-way selector valve which gives 5000 pounds pressure with a force of 35 pounds on its 12-inch handle. It is designed for corrosion resistant service with water, oil, gas.

35. International Rectifier Corp., Los Angeles 43, Calif., heavy duty selenium rectifiers with single phase bridge rating of 12 amperes. Features include interlocking components, conservatively rated terminals and moisture-proofing.

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Market Summary

STEEL SUPPLY—Further tightening of steel supply, possibly before the second quarter gets well under way, is anticipated as measures for stepping up domestic defense activities and extending aid to Europe accelerate.

In his address to Congress last week President Truman emphasized only the basic features of his program. Hence, standby military requirements, stockpiling of critical materials, and aims and methods for developing these needs remain unfolded.

MILITARY REQUIREMENTS—Requirements of the armed forces are due to be substantially increased. Expectations are special emphasis will be placed first on Air Force needs with reasonably early reflection likely in demand for alloys, special steels, etc.

CONTROLS—What may develop in the way of controls on distribution and possibly prices is anyone's guess. The President made no reference to this phase. However, the trade has been alerted by his remarks to the probability of something coming along this line later.

Last week the voluntary allocations program gained momentum. Several industry committee meetings are schedueled over the remainder of this month and expectations are steel allocation will be increased from now on. The farm equipment industry last week declined allocation assistance. However, the soil pipe group meets with government officials this week and a preliminary meeting of warehouse steel distributors with Office of Industry Co-operation executives will be held in the next few days.

STEEL DEMAND—Consumers may be expected to increase pressure for steel and materials of all kinds in anticipation of military inroads into available supplies. However, with respect to steel, the industry has been under pressure right along and any increased pressure from consumers is likely to bear little fruit.

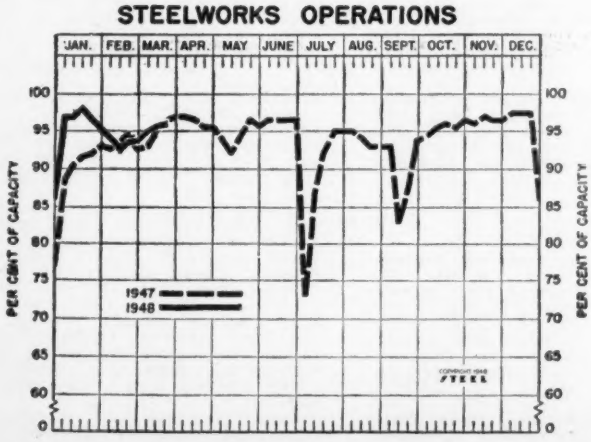
Work stoppage in the coal mines presents a serious threat to sustained flow of steel into consumption. Up to the end of last week the coal strike had only slightly affected steelmaking operations. However, foundry operations have been adversely affected at some points as result of curtailed coke shipments. Steel production will be cut this week should the coal strike continue. Some observers think the miners may not return to the pits until around Apr. 5 after a suspension of three weeks.

PRICES—The spotlight has been removed for the present from steel prices. Currently, the market is stable, only one upward revision being noted last week, this involving advances in extras on coatings for cold-rolled strip by one small producer. Still another company, Acme Steel Co., rescinded recent increases of $6 and $8 per ton on hot and cold-rolled strip, respectively, which it had put into effect late in February. As a general thing it is felt continued price stability hinges on the outcome of pending wage negotiations.

Reflecting a slightly firmer market in Chicago, STEEL's composite price average for steelmaking scrap last week rose to $40.25 from $40.17 the previous week and compared with $38 in the like week a year ago. On the other hand, due to recent easiness in scrap at Buffalo, Republic Steel Corp.'s pig iron price in that district declined, lowering the composite for steelmaking pig iron to $39.31 from $39.38. A year ago it stood at $32.49. Finished steel composite held unchanged at $81.14 and compared with $69.82 a year ago, while the semi-finished steel average held at $68.72 and compared with $52.10 last year.

SCRAP—The tense international situation has not strengthened scrap prices. At the moment the market is tending to the soft side. Should stepping up of the defense program lead to resumption of price control it is the general trade belief prices will be fixed at lower levels than now prevail.

STEELWORKS OPERATIONS



DISTRICT STEEL RATES

Percentage of Ingot Capacity engaged in Leading Districts

	Week Ended Mar. 20	Change	Same Week 1947	Same Week 1946
Pittsburgh	96.5	+ 1.5	99.5	96.5
Chicago	94.5	+ 0.5	95	88
Eastern Pa.	92	None	90	83
Youngstown	101	— 2	91	88
Wheeling	92.5	None	93.5	90.5
Cleveland	94.5	— 1	95	96.5
Buffalo	107.5	+ 6.5	90.5	83.5
Birmingham	100	None	99	95
New England	85	None	94	91
Cincinnati	102	— 4	91	76
St. Louis	77.5	None	74.5	54
Detroit	102	— 2	90	90
Estimated national rate	96	+ 0.5	96.5	88.5

Based on weekly steelmaking capacity of 1,802,476 net tons for 1948; 1,749,928 tons for 1947; 1,762,381 tons for 1946.

News Summary—P. 33 *Engineering News—P. 63*

COMPOSITE MARKET AVERAGES

Arithmetical Price Composites*

	Mar. 20	Mar. 13	Month Ago Feb. 1948	Year Ago Mar. 1947	5 Years Ago Mar. 1943
Finished Steel	$81.14	$81.14	$79.86	$69.82	$56.73
Semifinished Steel	68.72	68.72	67.16	52.10	36.00
Steelmaking Pig Iron	39.31	39.38	39.30	32.40	23.00
Steelmaking Scrap	40.25	40.17	40.48	37.25	19.17

FINISHED STEEL WEIGHTED COMPOSITE†	
Dec. 1947	3.49055c
Nov. 1947	3.47536c
Dec. 1946	2.91932c
Dec. 1942	2.38793c

* Straight Arithmetical Composites: Computed from average industry-wide base prices on Finished Carbon Steel (hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, standard and line pipe), on Semifinished Carbon Steel (rerolling billets and slabs, sheet bars, skelp, and wire rods), on Basic Pig Iron (at eight leading basing points), and on Steelworks Scrap (No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania). Steel arithmetical composite, dollars per net ton; pig iron and scrap, gross ton.

† Finished Steel Weighted Composite: Computed in cents per pound, base prices, weighted by actual monthly shipments of following products, representing 80 per cent of total steel shipments in the latest month for which statistics are available, as reported by American Iron & Steel Institute; Structural shapes; plates; standard rails; hot and cold-finished carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin and terne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip.

COMPARISON OF PRICES

Representative market figures for current week; average for last month, three months and one year ago. Finished material (except tin plate) and wire rods, cents per lb; semifinished (except wire rods) and coke, dollars per net ton; others dollars per gross ton.

Finished Materials

	March 20, 1948	Feb., 1948	Dec., 1947	Mar., 1947
Steel bars, Pittsburgh	2.90c	2.90c	2.90c	2.60c
Steel bars, del. Philadelphia	3.356	3.356	3.318	2.98
Steel bars, Chicago	2.90	2.90	2.90	2.60
Shapes, Pittsburgh	2.80	2.80	2.80	2.50
Shapes, del. Philadelphia	2.968	2.968	2.954	2.64
Shapes, Chicago	2.80	2.80	2.80	2.50
Plates, Pittsburgh	2.95	2.95	2.95	2.65
Plates, del. Philadelphia	3.19	3.19	3.17	2.85
Plates, Chicago	2.95	2.95	2.95	2.65
Sheets, hot-rolled, Pittsburgh	2.80	2.80	2.80	2.50
Sheets, cold-rolled, Pittsburgh	3.55	3.55	3.55	3.20
Sheets, No. 10 galv., Pittsburgh	3.95	3.95	3.90	3.55
Sheets, hot-rolled, Gary	2.80	2.80	2.80	2.50
Sheets, cold-rolled, Gary	3.55	3.55	3.55	3.20
Sheets, No. 10 galv., Gary	3.95	3.95	3.90	3.55
Strip, hot-rolled, Pittsburgh	3.05	2.925	2.80	2.50
Strip, cold-rolled, Pittsburgh	3.80	3.675	3.55	3.20
Bright basic, bess. wire, Pittsburgh	3.775	3.775	3.675	3.425
Wire nails, Pittsburgh	5.20	4.95	4.625	4.125
Tin plate, per base box, Pittsburgh	$6.70	$6.70	$5.75	$5.75

Semifinished

Sheet bars, Pittsburgh, Chicago	$60.00	$60.00	$60.00*	$50.00*
Slabs, Pittsburgh, Chicago	45.00	40.18	47.50*	42.00*
Rerolling billets, Pittsburgh	45.00	40.18	47.50*	42.00*
Wire rod 7/32 to 1/4-inch, Pitts.	3.175c	3.175c	3.05c	2.55c

* Per gross ton.

Pig Iron

	March 20, 1948	Feb., 1948	Dec., 1947	Mar., 1947
Bessemer, del. Pittsburgh (N.&S. sides)	$40.996	$40.996	$37.913	$34.83
Basic, Valley	39.00	39.00	36.00	33.00
Basic, eastern del. Philadelphia	42.004	42.004	38.84	34.26
No. 2 fdry., del. Pgh. (N.&S. sides)	40.496	40.496	37.413	34.33
No. 2 fdry., del. Philadelphia	42.504	42.504	39.34	34.76
No. 2 foundry, Chicago	39.00	39.00	36.00	33.00
No. 2 foundry, Valley	39.50	39.50	36.50	33.50
Southern No. 2, Birmingham	37.88	37.88	34.88	29.28
Southern, No. 2, del. Cincinnati	42.23	40.74	37.74	34.15
Malleable, Valley	39.50	39.50	36.50	33.50
Malleable, Chicago	39.50	39.50	36.50	33.50
Charcoal, low phos., fob Lyles, Tenn.	55.00	55.00	50.00	40.50
Ferromanganese, fob cars, Pittsburgh	151.00	151.00	151.00	140.25

Scrap

Heavy melt. steel, No. 1, Pittsburgh	$40.25	$40.44	$40.00	$37.25
Heavy melt. steel, No. 2, E. Pa.	39.00	39.125	41.625	38.50
Heavy melt. steel, No. 1, Chicago	39.00	39.125	38.75	35.125
Heavy melt, steel, No. 1, Valley	40.25	40.25	39.75	37.19
Heavy melt. steel, No. 1, Cleveland	39.75	39.75	39.25	36.19
Heavy melt. steel, No. 1, Buffalo	44.00	43.63	42.50	37.75
Rails for rerolling, Chicago	49.50	51.00	58.625	40.75
No. 1 cast, Chicago	66.00	66.00	55.875	43.25

Coke

Connellsville, beehive furnace	$12.50	$12.50	$12.25	$8.875
Connellsville, beehive foundry	14.875	14.78	14.50	10.375
Chicago, oven foundry, del.	19.25	19.25	18.975	16.10

FINISHED AND SEMIFINISHED IRON STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per net ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, open market, $90-$95 per gross ton. Forging quality $46, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, $56, per gross ton.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Buffalo, Birmingham, $45; Cleveland, $47; sales by smaller interests on negotiated basis at $85 per gross ton, or higher.

Forging Quality Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, $54.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $66 per gross ton.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Youngstown, $60 nom.; sales in open market $95-105 per gross ton.

Skelp: Pittsburgh, Youngstown, 2.90c per lb.

Tube Rounds: Pittsburgh, Chicago, Gary, Cleveland, $69-70; some sellers quoting up to $120.

Wire Rods: Pittsburgh, Chicago, Birmingham, 7/32 to 1/4-inch, inclusive, $2.80-3.55 per 100 lb. 7/32 to 47/64-in., inclusive, $2.75, Cleveland; Galveston, $2.95; Worcester, $2.90-2.95. San Francisco (base del.), $3.5245.

Bars

Hot-Rolled Carbon Bars (O.H. only) and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham, base, 20 tons one size, 2.90c; Detroit, del., 3.06c; eastern Mich., 3.13c; New York, del., 3.392c; Phila., del., 3.356c; San Francisco (base, del.), 3.6345-3.95c; Los Angeles (base, del.), 3.629-3.86; Seattle, 3.8375c-3.85c, base.

Rail Steel Bars: Same basing points as merchant carbon bars, except base is 10 tons. Prices upon application.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.30c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lb., 3.55c; Detroit, del., 3.71c; Toledo, 3.78c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Canton, base, 4.10c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngston, base, 2.75c; San Francisco (base, del.), 3.3345c; Los Angeles (base, del.), 3.329c; Seattle, 3.88c-4.18c base.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo. Prices upon application.

Iron Bars: Single refined, Pittsburgh 7.15c-†7.70c, double refined 8.00-†9.75c; Pittsburgh, staybolt, 8.85c-†11.25c.

† Hand puddled.

Sheets

Hot-Rolled Sheets (18 gage and heavier): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Ashland, Ky., base, 2.80c; Detroit, del., 2.96c; eastern Mich., del., 3.03; Philadelphia, del., 3.04c; New York, del., 3.172c; Los Angeles (base, del.), 3.544c; San Francisco, (base, del.), 3.5495c, (Alan Wood Steel Co., Conshohocken, Pa., quotes 4.20c, Sparrows Point equivalent).

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.55c; Granite City, 3.65c; Detroit, del., 3.71c; Eastern Mich., del., 3.78c; New York, del., 4.042c; Philadelphia, del., 4.006c.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) Pittsburgh, Gary, Birmingham, Sparrows Point, Canton, Middletown, 3.95c; Chicago, 3.95c-4.55c; Youngstown, 3.95c-4.45c; Granite City, 4.35c; New York, del., 4.322c; Philadelphia, del., 4.19c; Los Angeles (base, del.), 4.724c; San Francisco (base, del.), 4.7295c.

Corrugated Galvanized Sheets, No. 10: (Based on 5 cent zinc) Pittsburgh, Chicago, Gary, Birmingham base, 4.05c.

Culvert Sheets, No. 16 flat: (Based on 5 cent zinc; corrugated 10 cents extra) Pittsburgh, Gary, Birmingham: Copper alloy, 4.55c; copper-iron or pure iron, 4.90c; Chicago, 4.55c-4.90c and 4.90c, respectively; Granite City 5.00c and 5.35c, respectively. Los Angeles (base, del.), 5.344c; San Francisco (base, del), 5.3495c.

Aluminized Sheets: Hot-dipped, coils or cut to lengths: Pittsburgh, 7.50c.

Stainless-Clad 20%, annealed and pickled: Pittsburgh, Washington, No. 304, 22.00c; No. 410, 20.00c; No. 430, 20.50c; No. 446, 27.00c.

Long Ternes, No. 10: Pittsburgh, Chicago, Gary, base, 4.05c.

Enameling Sheets, No. 12: Pittsburgh, Chicago, Gary, Cleveland, Middletown, 3.95c; Youngstown 3.95c-4.45c; Granite City, 4.05c; Detroit, del., 4.11c; eastern Mich., 4.18c.

Electrical Sheets, No. 24: Field: Pittsburgh, Chicago, Gary, 4.50c; Kokomo, Ind., 4.60c. Armature: Pittsburgh, 4.80c-5.30c; Chicago, Gary, 4.80c; Granite City, Ill., 5.25c; Kokomo, Ind., 4.90c. **Electrical: Pittsburgh, 5.30c-5.80c; Chicago, Gary, 5.30c; Granite City, Ill., 5.75c; Kokomo, Ind., 5.40c. Motor: Pittsburgh,** 6.05-6.80c; **Chicago, Gary, 6.05c; Granite City, 6.50c.**

Dynamo: Pittsburgh, 6.75c-7.00c; Granite City, **7.20c. Transformer 72, 7.25-8.25c; 65,** 7.95-9.20c; **58, 8.65-9.90c; 52, 9.45c, Pittsburgh.**

Strip

Hot-Rolled Strip: Pittsburgh, 2.80c-3.30c; Chicago, Gary, Birmingham, Youngstown, base, 2.80c; Detroit, del., 2.96c; eastern Mich., del., 3.03c; San Francisco (base, del.), 3.605c; Los Angeles (base, del.), 3.60c.

Cold-Rolled Strip: 0.25 carbon and less: Pittsburgh, 3.55c-4.05c; Cleveland, Youngstown, 3.55c-3.85c; Chicago base, 3.65c; Detroit, del. 3.71c; eastern Mich., 3.78c; Worcester, base, 3.75c-4.45c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland base: 0.26-0.40 carbon, 3.55c; over 0.40 to 0.60 carbon, 5.05c; over 0.60 to 0.80, 5.65c; over 0.80 to 1.05, 7.15c; over 1.05 to 1.35, 9.45c; add 0.20c for Worcester.

Tin, Terne, Plate

Tin Plate: Pittsburgh, Chicago, Gary, Warren, O., per base box of 100 lb, 1.25 lb coating $6.60, 1.50 lb coating $6.80; Granite City, Birmingham, Sparrows Point, 1.25 lb coating $6.70, 1.50 lb coating $6.90.

Electrolytic Tin Plate: Pittsburgh, Gary, Warren, O., per base box of 100 lb, 0.25 lb tin, $5.80; 0.50 lb tin, $6.00; 0.75 lb tin $6.20; Granite City, Birmingham, Sparrows Point, $5.90, $6.10, $6.30, respectively.

Can Making Black Plate: Pittsburgh, Gary, Warren, O., per base box of 100 lb 0.55 to 0.70 lb tin, $5.20; 0.75 to 0.95 lb tin, $5.10; 100 to 128 lb tin, $5.20.

Holloware Enameling Black Plate: Pittsburgh, Chicago, Gary, Warren, O., base 29-gage, 4.75c per lb; Granite City, Birmingham, Sparrows Point, 4.85c per lb.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, per base box of 100 lb, $5.90; Granite City, Birmingham, Sparrows Point, $6.00.

Roofing Ternes: Pittsburgh, per package 112 sheets; 20 x 28 in., coating I.C. 8-lb $15.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, 2.95c; Coatesville, 3.45c; Claymont, 3.65c; Geneva, Utah, (base, del.), 3.125c; Det., del., 3.21c; New York, del., 3.322c; Phila., del., 3.19c; Boston, del., 3.423c; St. Louis, del., 3.269c; San Francisco and Los Angeles, del., 3.693c for sizes and grades produced at Geneva, 3.76c for sizes and grades produced at Fontana, Calif.
(Central Iron & Steel Co., Harrisburg, Pa., 4.75c, basing points.)

Floor Plates: Pittsburgh, Chicago, Cleveland, 4.20c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, 3.80c-4.137c; Coatesville, 4.80c.

Clad Steel Plates: Coatesville, 10% cladding: Nickel clad, 21.50c; inconel-clad, 30.00c; monel-clad, 24.00c. Pittsburgh, Washington, Coatesville, Pa., 20% stainless-clad, base prices including annealing and pickling; No. 304, 24.00c; No. 410, 22.00c; No. 430, 22.50c; No. 446, 29.00c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.80c; New York, del., 3.088c; Phila., del., 2.968c; Geneva, Utah (base, del.), 2.975c; Los Angeles (base, del.), 3.41-3.474c for sizes produced at Torrance, Calif., beyond sizes at Geneva; Los Angeles and San Francisco, del., 3.543c for sizes produced at Geneva; San Francisco, del., 3.41c for sizes produced at Fontana, Calif.

Alloy Structural Shapes: Pittsburgh, Chicago, 3.55c.

Steel Piling: Pittsburgh, Chicago, Buffalo, $3.30 per 100 lb.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds.)

Wire to Manufacturers in carloads

Bright, basic or bessemer	*$3.55-4.00
Basic MB Spring (except Birm.)	**$4.95
Upholstery Spring (except Birm.)	†$4.60

Wire Products to Trade in carloads

Wire, Merchant Quality	
Annealed (6 to 8 base)	††$4.20
Galvanized (6 to 8 base)	††$4.65

(Fob Pittsburgh, Chicago, Duluth, Birmingham, per base column).

Nails	
Standard, cement-coated, galvanized	‡94
Staples, polished and galvanized	‡‡94
Woven fence, 15½ gage and heavier	$100
Barbed wire, 80-rod spool	§§113
Fence Posts (with clamps)	107
Bale ties, single loop	§99

* Worcester, $3.65; Duluth, $3.60, base; San Francisco (base, del.), $4.56, bright basic only.

** Worcester, $5.05; Duluth & Trenton, N.J., $5.20 (bright only); San Francisco (base del.) $5.9845.

† Worcester $4.70; Duluth and Trenton, N. J., $4.85, base. San Francisco (base, del.) $5.6345 black upholstery.

†† One producer quotes 25 cents higher at Birmingham and Chicago; Worcester $4.30, annealed; $4.75, galvanized. Duluth $4.20, annealed, $4.65, galvanized. San Francisco (base, del.) $5.21, annealed, $5.66 galvanized.

‡ Cols. 108 and 114 also quoted Pittsburgh; Worcester 100; Cleveland 97; San Francisco (base, del.) 115.

‡‡ Cols. 108 and 114 also quoted Pittsburgh; Worcester 100, San Francisco (base del.) 115.

§ San Francisco (base del.) 123.

§§ San Francisco (base del.) 133.

Rails, Supplies

Rails: Standard, over 60-lb fob mill, $2.75 per 100 lb. Light rails (billet), Pittsburgh, Birmingham, $3.10 per 100 lb; light rails (rail steel), Williamsport, Pa., Pittsburgh prices upon application.
Relaying, 60 lb and over fob warehouse $60-$65 per net ton.

Supplies: Track bolts, 7.00c; heat treated, 7.25c. Tie plates, $3.65 per 100 lb, fob mill; $3.40 base, Seattle; $3.80 base, Pittsburg, Calif. Splice bars $3.85 per 100 lb, fob mill. Standard spikes, 4.85c; screw spikes, 6.75c. Axles, 4.50c.

Tubular Goods

Standard Steel Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ind., 2 points less on steel lap weld and 1 point less on steel butt weld on sizes produced in that district.

	Butt Weld			Butt Weld	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	44½	17	1	52½	36½
¼	44½	21½	1¼	53	37
⅜	41	17	1½	53½	37½
½	47	29½	2	54	38
¾	50	33½	2½ & 3	54½	38½

	Lap Weld		Elec. Weld		Seamless	
In.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
2	44½	28	44	27½	43½	27
2½-3	48½	32	47	30½	46½	30
3½-6	50½	34	49	32½	48½	32

Line Steel Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

	Butt Weld		Butt Weld
In.		In.	
⅛	43½	1	51½
¼	43½	1¼	52
⅜	40	1½	52½
½	46	2	53
¾	49	2½ & 3	53½

In	Lap Weld	Elec. Weld	Seamless
2	43½	43	42½
2½ & 3	47½	46	45½
3½-6	49½	48	47½
8	55½	50	49½
10	55	49½	49
12	54	48½	48

Standard Wrought Iron Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh.

	Butt Weld		Lap Weld		
In	Blk.	Gal.	In	Blk.	Gal.
½	+11	+35	2	—1½	+20
¾	+ 1½	+25	2½-3½	—4	+16
1 and			4	—8	+10½
1¼	— 4	+16½	4½-8	—6	+12
1½	— 9½	+13			
2	—10	+12½			

Boiler Tubes: Net base prices per 100 ft, fob Pittsburgh, in carload lots, minimum wall thickness, cut lengths 4 to 24 feet, inclusive.

		—Seamless—		—Elec. Weld—	
O.D.		Hot	Cold	Hot	Cold
Sizes	B.W.G.	Rolled	Drawn	Rolled	Drawn
1"	13	....	$12.46	$11.51	$11.51
1¼"	13	....	14.76	11.48	13.64
1½"	13	$14.00	16.47	12.69	15.22
1¾"	13	15.92	18.74	14.43	17.31
2"	13	17.84	20.99	16.17	19.39
2¼"	13	19.88	23.40	18.02	21.62
2¼"	12	21.90	25.77	19.86	23.80
2½"	12	23.99	28.21	21.75	26.06
2¾"	12	25.42	29.90	23.05	27.63
3"	12	26.68	31.40	24.18	29.00
3¼"	11	31.06	36.55	28.16	33.77
3½"	11	33.35	39.26	30.23	36.27
4"	10	41.40	48.70	37.53	44.99
4½"	9	54.87	64.58	....	....
5"	9	63.52	74.74	....	....
6"	7	97.51	114.73	....	....

Pipe Cast Iron: Class B, 6-in. and over $79.50 per net ton, Birmingham; $84.50, Burlington, N. J.; $91.12, del. Chicago; 4-in. pipe, $5 higher; class A pipe, $5 a ton over Class B.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 19c per cwt in carlots, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step, plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length	45 off
⅝ and ⅝ x 6-in. and shorter	46 off
⅝-in. and larger x 6-in. and shorter	43 off
All diameters longer than 6-in.	41 off
Tire bolts	35 off
Step bolts	43 off
Plow bolts	54 off
Lag bolts	
All diameters 6 in. and shorter	46 off
All diameters longer than 6 in.	44 off

Stove Bolts

In packages, nuts separate, 65-10 off; bulk 75 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

Nuts

Semifinished hexagon	A.S. Light	A.S. Reg. and Heavy
⅞-in. and smaller	46 off	....
1-in. and smaller	....	44 off
½-in.-1-in.	44 off	....
⅞-in.-1-in.	....	43 off
1⅛-in.-1½-in.	42 off	41 off
1⅝-in. and larger	....	35 off

Additional discount of 15 for full containers.

Hexagon Cap Screws (Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright)	53 off
Upset (1035 heat treated)	
⅝ and smaller x 6 and shorter	48 off
¾, ⅞, & 1 x 6 and shorter	44 off

Square Head Set Screws

Upset 1-in. and smaller	57 off
Headless, ¼-in. and larger	40 off
No. 10 and smaller	52 off

Rivets

Fob Pittsburgh, Cleveland, Chicago, Birmingham

Structural ½-in. and larger	5.65c
Lebanon, Pa.	5.65c plus 19c per cwt in cl., 26c lcl.
⅞-in and under	55 off
Lebanon, Pa.	55 off plus 19c per cwt in cl., 26c lcl.

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl $1-$2 off

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 16.00-17.00c; extra carbon 20.00c; special carbon 24.00c; oil-hardening 26.00c; high carbon-chromium 47.00c.

W	Cr	V	Mo	Base Per lb
18.00	4	1	...	82.00c
1.5	4	1	8.5	59.00c
12	3	0.50	...	67.00c
6.40	4.15	1.90	5	63.00c
5.50	4.50	4	4.50	80.00c

Stainless Steels

Base, Cents per lb

Grade	Bars, Drawn Wire, Structurals	Plate	Sheets	Hot Rolled Strip	Cold Rolled Strip
CHROMIUM NICKEL STEELS					
301	26.00c	29.50c	37.00c	22.00c	28.00c
302	26.00	29.50	37.00	23.50	30.50
303	28.50	31.50	39.00	29.50	36.00
304	27.50	31.50	39.00	25.50	32.50
308	31.50	37.00	44.50	31.00	38.00
309	39.00	43.50	51.00	40.50	51.00
310	53.50	56.50	57.00	53.00	61.00
316	43.50	48.00	52.00	43.50	52.00
321	31.50	37.00	44.50	32.00	41.50
347	36.00	41.50	49.00	36.00	45.50
431	21.00	24.00	31.50	19.00	24.50
440A	26.00	31.00	36.50	26.00	30.50
STRAIGHT CHROMIUM STEEL					
408	23.50	27.00	32.00	23.00	29.50
410	20.50	23.50	29.00	18.50	24.00
416	21.00	24.00	29.50	20.00	25.50
420	26.00	31.00	36.50	26.00	39.50
430	21.00	24.00	31.50	19.00	24.50
430F	21.50	24.50	32.00	20.50	27.00
442, 443	24.50	28.00	35.50	26.00	35.00
446	30.00	33.00	39.50	38.00	56.50
†501	9.00	13.00	17.50	13.00	18.50
†502	10.00	14.50	18.50	14.50	19.50
‡STAINLESS CLAD STEEL (20%)					
304	....	24.00	22.00	....	....
410	....	22.00	20.00	....	....
430	....	22.50	20.50	....	....
446	....	29.00	27.00	....	....

† Low chromium. ‡ Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

	Per Gross Ton			
	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., base	$40.00	$40.50	$41.00	$41.50
Newark, N. J., del.	42.208	42.708	43.208	43.708
Brooklyn, N. Y., del.	....	44.10	44.60	....
Philadelphia, del.	42.004	42.504	43.004	43.504
Birmingham, base	35.88†	36.38†	....	....
Cincinnati, del.	....	42.23	....	....
Buffalo, base	40.00†	40.00†	40.50†	41.00
Boston, del.	47.776	47.776	48.276	....
Rochester, del.	42.22	42.22	42.72	43.22
Syracuse, del.	43.025	43.025	43.525	44.025
Chicago, base	38.50	39.00	39.50	40.00
Milwaukee, del.	40.08	40.58	41.08	41.58
Muskegon, Mich., del.	....	43.60	44.10	....
Cleveland, fob furnace	38.50†	39.00†	39.50†	40.00
Akron, del.	40.50	41.00	41.50	42.00
Duluth, base	39.00	39.50	40.00	40.50
Erie, Pa., base	38.50	39.00	39.50	40.00
Everett, Mass., base	....	45.00	45.50	....
Granite City, Ill., base	39.50	40.00	40.50	....
St. Louis, del.	40.25	40.75	41.25	....
‡**Neville Island, Pa.,** base	39.00	39.50	39.50	40.00
Pittsburgh, del., N.&S. Sides	39.996	40.496	40.496	40.996
Provo, Utah, base	39.00	39.50	....	....
Seattle, Tacoma, Wash., del.	....	46.63	....	....
Portland, Oreg., del.	....	46.63	....	....
Los Angeles, San Francisco	46.13	46.63	....	....
Sharpsville, Pa., base	39.00	39.50	39.50	40.00
Steelton, Pa., base	40.00	40.50	41.00	41.50
Struthers, O., base	39.50	....	....	....
Swedeland, Pa., base	45.00	45.50	46.00	46.50
Toledo, O., base	38.50	39.00	39.50	40.00
Cincinnati, del.	42.70	43.20	....	....
Youngstown, O., base	39.00	39.50	39.50	40.00
Mansfield, O.	42.57	43.07	43.07	43.57

† Republic Steel Corp. quotes $3 a ton higher at Birmingham, effective Jan. 1, 1948; Republic quotes $4.50 higher for No. 2 foundry and malleable and $4 higher for basic at Buffalo, and $1.25 higher at Cleveland, effective on shipments during week ended Mar. 21.

‡ To Neville Island base add: 79.2c for McKees Rocks, Pa., $1.212 Lawrenceville, Homestead, McKeesport, Monaco; $1.788 Oakmont; $1.596 Verona; $1.788 Brackenridge; 99.6c to Ambridge and Aliquippa.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent (base)....$49.50
6.51-7.00..$50.75 9.01- 9.50. 57.00
7.01-7.50.. 52.00 9.51-10.00. 58.25
7.51-8.00.. 53.25 10.01-10.50. 59.50
8.01-8.50.. 54.50 10.51-11.00. 60.75
8.51-9.00.. 55.75 11.01-11.50. 62.00

Fob Jackson, O., per gross ton; Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Bessemer Ferrosilicon

Prices same as for blast furnace silvery iron, plus $1 per gross ton.

Electric Furnace Silvery Pig Iron 8 to 14.01-14.50%, $77.50, Jackson, O.; $78.75, Niagara Falls; $78 open-hearth and $79 foundry grade, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.05% Mn over 1%; $1 a ton for 0.045% max. phos.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn.....$55.00 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $39.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., $46.00. Philadelphia, $48.592, delivered. Intermediate phosphorus, Central furnace, Cleveland, $42.00.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Metallurgical Coke

Price per Net Ton

Beehive Ovens

Connellsville, furnace	$12.00-$13.00
Connellsville, foundry	14.00- 15.75
New River, foundry	12.50
Wise county, foundry	11.15
Wise county, furnace	10.65

Oven Foundry Coke

Kearney, N. J., ovens	$18.75
Chicago, outside del.	18.00
Chicago, del.	19.25
Terre Haute, ovens	18.50
Milwaukee, ovens	18.75
New England, del.	20.40-20.45
Birmingham, del.	15.76
Indianapolis, ovens	18.50
Cincinnati, del.	18.95
Ironton, O., ovens	16.75
Erie, Pa., del.	19.45
Painesville, O., ovens	18.10
Cleveland, del.	19.60
Buffalo, del.	20.15
Detroit, del.	19.00
Philadelphia, ovens	17.75
Swedeland, Pa., ovens	17.75
Portsmouth, O., ovens	17.00

Coal Chemicals

Spot, cents per gallon

Pure and 90% benzol	21.00†
Toluol, two degrees	28.00
Industrial xylol	28.00
Solvent naphtha	28.00

Per pound fob works

Phenol (car lots, returnable drums)	12.50
Do., less than carlots	13.25
Do., tank cars	11.50

Eastern plants, per pound

Naphthalene flakes, balls, bbl. to jobbers, "household use"	11.00

Per ton, bulk, fob plants

Sulphate of ammonia	$40.00

† Freight allowed up to 2 cents.

Refractories

Net Prices

Per 1000, fob shipping point

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$92.00

High Heat Duty

Pa., Ill., Md., Mo., Ky.	73.00
Ala., Ga.	73.00
N. J.	78.00

Intermediate Heat Duty

Ohio	67.00
Pa., Ill., Md., Mo., Ky.	67.00
Ala., Ga.	59.00
N. J.	70.00

Low-Heat Duty

Pa., Md., Ohio	59.00

Ladle Brick

(Pa., O., Va., Mo.)

Dry Press	50.00
Wire Cut	48.00

Malleable Bung Brick

All bases	83.00

Silica Brick

Pennsylvania	73.00
Joliet, E. Chicago	82.00
Birmingham, Ala.	73.00

Basic Brick

Net tons, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	64.00
Chem. bonded chrome	64.00
Magnesite brick	86.00
Chem. bonded magnesite	75.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.

Bulk	27.00
Single bags	31.50

Dolomite

Domestic, dead-burned, bulk, net tons, fob Billmeyer, Blue Bell or Williams, Pa., Millville, W. Va., Nario, Millersville, Martin, Gibsonburg or Woodville, O., $11.05; Midwest (fob Thornton or McCook, Ill.), add $0.10; Missouri Valley (fob Dolly Siding, and Bonne Terre, Mo.), add $0.20.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$5.95
Old range nonbessemer	5.80
Mesabi bessemer	5.70
Mesabi nonbessemer	5.55
High phosphorus	5.55

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56.62% contract	15.25

Foreign Ore

Cents per unit, cif Atlantic ports

No. African low phos.	Nom.
Swedish basic, 60 to 68%.	13.50-14.00
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro, nom.	5.50-6.50

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid	$26-$28

Manganese Ore

48-50%, duty paid, fob cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 65.00-67.00c.

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., and/or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$37.50
48% 3:1	39.00
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	$25.50-$26.00
45% no ratio	26.50
48% no ratio	28.50
50% no ratio	29.50
Brazilian—nominal	
44% to 2.5:1 lump	$33.65
Rhodesian	
45% no ratio	$27-$27.50
48% no ratio	30.00
48% 3:1 lump	39.00
Domestic (seller's nearest rail)	
48% 3:1	$39.00

Molybdenum

Sulphide conc., lb., Mo. cont., Mines	$0.75

Fluorspar

Metallurgical grade, fob shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $35; less than 60% $32.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Massillon
Sheet, Hot-Rolled	4.30	4.30	4.30	4.30	4.30	4.30	...	...	...
Cold-Rolled	5.30	5.30	5.30	5.30	...	5.30	...	...	...
Galvanized	6.00	...	...	...	...	6.00	...	...	...
Strip, Hot-Rolled	4.30	4.30	4.30	4.30	...	...	...	...	...
Cold-Rolled	5.30	5.30†	5.30†	5.30	...	...	...	...	...
Shapes, structural	4.30	4.30	...	4.30	...	...	4.30	...	...
Plates	4.55	4.55	4.55	...	4.55	...	...	...	...
Bars, Small Shapes	4.45	4.45	4.45	4.45	...	4.45	...	4.45	4.45

† Nax High Tensile, produced by Great Lakes Steel Corp., quoted 10 cents higher.

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras.

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. *10G	Gal. *24G	†H-R	†C-R	H-R Rds. ⅜" to 3"	C-F Rds. ½"& up	H-R Alloy (**4140)	Structural Shapes	Carbon ⅜"-¾"	Floor ⅜" & Thicker
Boston (city)	5.03	6.09[4]	5.79[4]	6.23[4]	7.58[4]	5.61	6.87	5.04	5.88	7.64	4.91	5.18	6.86
New York (city)	4.96	6.16	5.86	6.16	7.51	5.59	...	5.06	5.63	7.23	4.80	5.11	6.78
New York (country)	4.81	6.01	5.71	6.01	7.36	5.44	...	4.91	...	...	4.65	4.96	6.63
Philadelphia (city)	4.70	6.32	5.92	5.90	7.25	5.32	5.72	4.87	5.75	8.77	4.57	4.85	6.47
Philadelphia (country)	4.55	6.18	5.78	5.75	7.10	5.17	5.57	4.73	...	...	4.47	4.71	6.32
Baltimore (city)	4.32†	5.95	5.65	5.72	7.07	4.80	...	4.85	5.71	...	4.71	4.77	6.30
Baltimore (country)	4.17†	5.80	5.50	5.50	6.85	4.65	...	4.70	...	...	4.56	4.62	6.15
Washington (city)	4.81	...	...	...	...	5.08	...	5.14	5.79[12]	...	4.98	5.03	6.60
Washington (country)	4.71	...	...	...	...	4.98	...	5.04	...	...	4.88	4.93	6.50
Norfolk, Va.	4.90	...	...	...	...	...	...	5.20	6.00	...	5.15	5.15	6.90
Memphis, Tenn. (city)	4.82[20]‡‡	5.87[20]†	...	6.37	...	5.02[20]	...	4.97[20]	5.87	...	4.97[20]	5.17[20]	6.87[20]
Memphis, Tenn. (country)	4.72[20]‡‡	5.77[20]†	...	6.27	...	4.92[20]	...	4.87[20]	5.77	...	4.87[20]	5.07[20]	6.77[20]
Buffalo (city)	4.45	...	5.20[5]	6.05	...	5.25	5.65	4.40	5.10	6.85	4.40	5.00	6.25
Buffalo (country)	4.30	...	5.05[5]	5.50	...	4.70	5.50	4.25	4.95	6.85	4.25	4.45	5.75
Pittsburgh (city)	4.25‡‡	...	5.10[8]†	5.65	6.90	4.35	5.35	4.40	5.10	6.85	4.40	4.60	5.90
Pittsburgh (country)	4.10‡‡	...	4.95[8]†	5.50	6.75	4.20	5.20	4.25	4.95	6.85	4.25	4.45	5.75
Cleveland (city)	4.45	5.50[8]	5.20[8]	5.82	7.17	4.55	5.35	4.40	5.10	7.22	4.70	4.60	6.05
Cleveland (country)	4.30	5.35[8]	5.05[8]	...	...	...	5.20	4.25	4.95	...	...	4.45	5.90
Cincinnati	4.56	...	5.22	5.77	...	4.77	...	4.78	5.63	...	4.82	4.98	6.47
Detroit	4.55	...	5.30	...	...	4.72	5.63	4.50	5.22	7.10	4.77	4.88	6.28
Indianapolis	4.55	5.32[9]	...	5.87	7.12	4.65	5.90	4.70‡‡	5.40	8.85	4.70	4.90	6.35
Chicago (city)	4.45	5.50[8]	5.20[8]	5.65	6.90	4.35	5.45	4.40	5.10	6.85[9]	4.40	4.60	6.05
Chicago (country)	4.30	5.35[8]	5.05[8]	5.50	6.75	4.20	5.30	4.25	4.95	6.85[9]	4.25	4.45	5.90
Milwaukee	4.658	5.708[8]	5.408[8]	5.858	7.108	4.558	5.658	4.608	5.308	7.208[9]	4.608	4.808	6.258
St. Louis	4.78	5.83[8]	5.53[8]	6.02	7.27	4.68	5.82	4.73	5.47[12]	...	4.73	4.93	6.38
Birmingham (city)	4.45[20]‡‡	...	...	5.65	...	4.45[20]	...	4.40[20]	5.93[22]	...	4.40	4.65	6.86
Birmingham (country)	4.30[20]‡‡	...	...	5.50	...	4.30[20]	...	4.25[20]	...	...	4.25	4.50	...
New Orleans	4.98[20]**	...	6.29[18]	...	...	5.18[20]	...	5.13[20]††	6.29[11]	...	5.03[20]††	5.33[20]	7.29[20]
Omaha, Nebr.	5.462	...	...	6.712	8.012	5.362	...	5.412	6.112	7.562	5.412	5.612	7.062
Houston, Tex.	5.75	...	...	7.36	8.10	6.00	...	5.35	7.00[12]	...	5.85	5.85	6.50
Los Angeles (city)	5.75	7.75[8]	7.45[8]	7.40	8.80	6.05	8.70	5.50	7.35[22]	9.35[10]	5.35	5.55	7.65
Los Angeles (country)	5.60	7.60[8]	7.30[8]	7.25	8.65	5.90	8.55	5.35	7.20[1]	9.20[10]	5.20	5.40	7.50
San Francisco	5.40[21]	6.65[5]	...	7.05[5]	7.95[5]	5.75[21]	8.70[15]	5.05[21]	7.00[12]	...	5.30[21]	5.50[21]	7.10[21]
Seattle, Tacoma, Wash.	5.30[17]‡‡	...	7.10[8]‡	6.95	...	5.60[17]	...	5.45[17]	7.45[19]	8.50[12]	5.25[17]	5.55[17]	7.65[17]
Portland, Oreg.	5.30[17]‡‡	...	7.10[8]‡	6.70	...	5.60[17]	...	5.45[17]	7.45[19]	...	5.25[17]	5.45[17]	7.55[17]

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over, cold finished bars, 1000 lb and over; galvanized sheets, 450 to 1499 lb; [1]—1500 lb and over; [2]—1000 to 4999 lb; [4]—three to 24 bundles; [5]—450 to 1499 lb; [8]—400 to 1499 lb; [9]—1000 to 1999 lb; [11]—1000 to 39,999 lb; [12]—1000 lb and over; [15]—2000 lb and over; [17]—300 to 9999 lb; [18]—1500 to 1999 lb; [19]—1500 to 39,999 lb; [20]—400 to 3999 lb; [21]—400 lb and over; [22]—500 to 1499 lb.

* Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ 15 gage; ** as rolled; †† add 0.40 for sizes not rolled in Birmingham; ‡‡ add 15c for 100 lb for slow moving items; §§ 18 gage and heavier.

PRICES OF LEADING FERROALLOYS PRODUCTS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $47, Palmerton, Pa., $51, Pittsburgh. 16% to 19% Mn., $46, Palmerton, $50, Pittsburgh.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.). Carload, lump, bulk $145 per gross ton of alloy, carload packed $157, ton lot $172, less ton $189; fob New Orleans, Mobile, Philadelphia, Baltimore, or New York. Carload, lump, bulk $151, fob cars Pittsburgh, including 50c switching charge. Add, or subtract, $1.80 for each 1%, or fraction thereof, of contained manganese over 82% or under 78%. **West Coast Prices:** Carload (80,000 lb or more), lump, bulk, same price and basing points as above. All other prices for shipment from Pacific Coast warehouses, add $26.21 to above prices. Delivery is fob Portland, Los Angeles, South San Francisco, or Seattle warehouses, with railroad freight allowed on shipments of 25 gross tons or more.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Eastern Zone, carload, lump, bulk, max. 0.10% C, 22.5c per lb of contained Mn, carload packed 23.25c, ton lot 24.35c, less ton 25.55c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.7c for c.l. and 4.4c for l.c.l. Freight allowed. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 0.75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Eastern Zone, carload, lump, bulk 16.5c per lb of contained Mn, carload packed 17.25c, ton lot 18.35c, less ton 19.55c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.7c for c.l. and 4.4c for l.c.l. Freight allowed. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Eastern Zone, carload, 2" x D, bulk 32c per lb of metal, carload packed 32.5c, ton lot 34c, less ton 36c; Central, add 1c for c.l. and 1.45c for l.c.l.; Western, add 1.45c for c.l. and 2.4c for l.c.l. Freight allowed. Spot, add 2c.

Silicomanganese: (Mn 65-70%). Eastern Zone, contract, lump, bulk, 1.50% C grade, 17-20% Si, 7.8c per lb of alloy, carload packed, 8.55c, ton lot 9.45c, less ton 10.45; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5 for l.c.l. Freight allowed. For 2.0% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Eastern Zone, contract, c.l., lump, bulk 18.6c per lb of contained Cr, c.l., packed 19.5c, ton lot 20.65c, less ton 22.05c; Central, add 0.4c for c.l. and 1.3c for l.c.l.; Western, add 0.55c for c.l. and 2.1c for l.c.l. Freight allowed. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Eastern Zone, contract, c.l.,8MxD, bulk 20.1c per lb of contained Cr, c.l., packed 21.0c, ton lot 22.35c, less ton 24.1c; Central, add 0.4c for c.l. and 1.3c for l.c.l.; Western, add 0.55c for c.l. and 2.1c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Eastern Zone, contract, carload, lump, bulk, max. 0.03% C 28.5c per lb of contained Cr, 0.04% C 27.5c, 0.05% C 27.0c, 0.06% C 26.5c, 0.10% C 26.0c, 0.15% C25.5c, 0.20% C 25.25c, 0.50% C 25.0c, 1% C 24.5c, 2% C 24.25c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c; Central, add 0.4c for c.l. and 0.65c for l.c.l.; Western, add 0.5c for c.l. and 1.85c for l.c.l. Freight allowed. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, add C 1.25% max.). Eastern Zone, contract, carload, lump, bulk 25c per lb of contained chromium, carload, packed 26.1c, ton lot 27.3c, less ton 29.1c; Central, add 0.4c for c.l. and 0.65c for l.c.l.; Western, add 0.5c for c.l. and 1.85c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 2c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 2c for each 0.25% of N above 0.75%.

Chromium Metal: (Mn. 97% Cr and 1% Fe). Eastern Zone, contract, carload, 1" x D, packed, max. 0.50% C grade, 93c per lb of contained chromium, ton lot 94.5c, less ton 97c; Central, add 1.5c for c.l. and 2.5c for l.c.l.; Western, add 2.75c for c.l. and 4.5c for l.c.l. Freight alowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 9.3c per lb of contained Si. carload packed 10.9, ton lot 12.35c, less ton 14.0c; Central, add 0.5c for c.l. and 1.25c for l.c.l.; Western, add 0.7c for c.l. and 1.8c for l.c.l. Freight allowed. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (All 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 11.8c per lb of contained Si carload packed 13.1c, ton lot 14.25c, less ton 15.5c; Central, add 0.3c for c.l. add 0.75c for l.c.l.; Western, add 1.05c for c.l. and 5c for l.c.l. Freight allowed. Spot, add 0.3c.

85% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 13.3c per lb of contained, Si carload packed 14.55c, ton lot 15.55c, less ton 16.7c; Central, add 0.3c for c.l. and 0.7c for l.c.l.; Western, add 1.05c for c.l. and 4.4c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk, 15c per lb of contained Si carload packed 16.2c, ton lot 17.15c, less ton 18.2c; Central, add 0.3c for c.l. and 0.65c for l.c.l.; Western, add 1c for c.l. and 4c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Over 97% Si and 1% max. Fe). Eastern Zone, c.l., lump, bulk, regular 17.3c per lb of Si, c.l. packed 18.5c, ton lot 19.4c, less ton 20.4c; Central, add 0.6c for c.l. and 2.25c for l.c.l.; Western, add 1.2c for c.l. and 4c for l.c.l. Add 1c for max. 0.20% calcium grade. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing over 96% Si. Spot, add 0.25c.

Alsifer: (Aprox. 20% Al, 40% Si, 40% Fe) Contract basis fob Niagara Falls, N. Y., lump per lb c.l. 6.90c; ton lots packed, 7.40c; 200 to 1999 lb, 8.15c; smaller lots, 8.65c. Spot up 0.5c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3½ lb each and containing exactly 2 lb of Cr). Eastern Zone, contract, carload, bulk, 12.5c per lb or briquet, carload packed 13.2c ton lot 14.0c, less ton 14.9c; Central, add 0.25c for c.l. and 0.9c for l.c.l.; Western, add 0.35c for c.l. and 1.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Eastern Zone, contract, carload, bulk, 8.7c per lb of briquet, c.l. packaged 9.5c, ton lot 10.3c, less ton 11.2c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Eastern Zone, contract, c.l. bulk 8.75c per lb of briquet, c.l. packed 9.55c, ton lot 10.35c, less ton 11.25c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Eastern Zone, contract, carload, bulk 5.1c per lb of briquet, c.l. packed 5.25c, ton lot 6.7c, less ton 7.6c. **(Small size**—weighing approx. 2½ lb and containing exactly 1 lb of Si). Eastern Zone, carload, bulk 5.25c, c.l. packed 6.05c, ton lot 6.85c, less ton 7.75c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.45c for c.l. and 0.9c for l.c.l. Freight allowed. Add 0.25c for notching, small size only. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Eastern Zone, contract, carload, lump, bulk 17.50c per lb of alloy, carload packed 19.0c, ton lot 19.8c, less ton 20.8c; Central, add 0.5c for c.l. and 0.85c for l.c.l.; Western, add 2.55c for c.l. and 2.6c for l.c.l. Freight allowed. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Eastern Zone, contract, carload, lump, bulk 16.25c per lb of alloy, carload packed 16.45c, ton lot 19.35c, less ton 20.85c; Central, add 0.5c for c.l. and 0.75c for l.c.l.; Western, add 2.55c for c.l. and 2.90c for l.c.l. Freight allowed. Spot, add 0.25c.

VANADIUM ALLOYS

Ferrovanadium: Open Hearth Grade (Va 50-55%, Si 8% max., C 3% max.). Eastern Zone, contract, any quantity, $2.90 per lb of contained Va; Central, add 2c for c.l. and 3c for l.c.l.; Western, add 6c for c.l. and 9c for l.c.l. Freight allowed. Spot, add 10c. **Special Grade** (Va 50-55%, Si 4% max., C 1% max.), $3. **High Speed Grade** (Va 50-55%, Si 1.50% max., C .20% max.), $3.10.

Vanadium Oxide: All Zones, contract, less carload lots, $1.20 per lb of contained V_2O_5. Spot, add 5c.

Grainal: Vanadium Grainal No. 1, 93c; No. 6, 63c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

TITANIUM ALLOYS

Ferrotitanium: (Ti 20-25%, Al 3% max., Si 4% max., C 0.10% max.). Eastern Zone, contract, ton lot, 2″ x D, $1.35 per lb of contained Ti, less ton $1.40. (Ti 40-45%, Al 7% max., Si 4% max., C 0.10% max.). Ton lot $1.23, less ton $1.25; Central, add 4c for 20-25% Ti grade, and 2.1c for 40-45% grade; Western, add 13.5c for 20-25% Ti grade, and 7.2c for 40-45% grade. Freight allowed. Spot, add 5c.

Ferrotitanium, High-Carbon: (15-20%). Contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C, $142.50; 3-5% C, $157.50.

TUNGSTEN ALLOYS

Ferrotungsten: (W 70-80%). Eastern Zone, contract, 10,000 lb W or more, $2.25 per lb of contained W; 200 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Eastern Zone, contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Eastern Zone, contract, c.l., lump, bulk 6c per lb of alloy, c.l. packed 6.75c, ton lot 7.5c, less ton 8.35c; Central, add 0.25c for c.l. and 1.1c for l.c.l.; Western, add 0.6c for c.l. and 3.95c for l.c.l. Freight allowed. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Eastern Zone, contract, carload, lump, packed 18.4c per lb of alloy, ton lot 19.15c, less ton 20.40c; Central, add 0.6c for c.l. and 1.05c for l.c.l.; Western add 3.05c for c.l. and 4c for l.c.l. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Eastern Zone, contract, 100 lb or more, 1″ x D, $1.20 per lb of alloy, freight allowed. Less than 100 lb $1.30; Central, add 0.75c; Western add 2.9c, freight allowed. Spot, add 5c.

Borosil: (3 to 4% B, 40 to 45% Si). $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

OTHER FERROALLOYS

Ferrocolumbium: Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Eastern Zone, contract, ton lot, 2″ x D, $2.50 per lb of contained Cb, less ton $2.55; Central, add 1.65c; Western, add 6.45c. Freight allowed. Spot, add 10c.

CMSZ Mixes: No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Eastern Zone, carload, 12 M x D, carload packed 17.25c per lb of material, ton lot 18.00c, less ton 19.25c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, Boron 0.55-0.75%). Eastern Zone, carload, packed, 1″ x D, 39c per lb of alloy, ton lot 41c, less ton 43c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Eastern Zone, contract, carload, packed, ½″ x 12 M, 15.0c per lb of alloy, ton lot 15.75c, less ton 17.0c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed. Spot, add 0.25c.

Simanal: (Approx. 20% each Si, Mn, Al). Packed, lump, carload 10c, ton lots 10.25c, smaller lots 10.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Ferrophosphorus: 17-19% based on 18% P content with unitage of $3 for each 1% of P above or below the base) Gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferromolybdenum: (55-75%). Per lb, contained Mo. fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Brass Ingot and Copper Scrap Prices Rise

Uptrend is attributed to continued shortage of red metal scrap. Major metals hold

NEW YORK — A leading seller of brass and bronze ingots raised prices 1/2-cent last week on ingots No. 115 120, 123, 245, 405 and 421, thereby reducing the price spread on these items. This action was attributed to a shortage of ingot-making scrap and was followed by advances of 1/4-cent in refiners' bids for Nos. 1 and 2 copper scrap and light copper scrap. Major nonferrous metal prices held unchanged.

COPPER — Stocks of refined copper in the United States declined 1387 tons during February to a total of 70,146 tons, according to the Copper Institute. Deliveries dropped 12,032 tons to 106,032 tons during the month while production of refined copper eased 8726 tons to 93,588 tons. Production of crude copper amounted to 72,351 tons from primary and 10,701 tons from secondary sources. Shipments of copper by foreign producers to consumers outside the United States dropped 24,829 tons during February, totaling 55,133 tons.

Magma Copper Co.'s San Manuel copper orebody in Arizona, now under development, contains the second largest tonnage of copper in any known deposit in the United States, according to company officials. Work so far has developed an estimated 462,784,500 tons of ore averaging 0.782 per cent copper content.

LEAD — Stocks of lead held by smelters and refiners dropped for the fourth consecutive month during January to only 120,123 tons, the lowest level recorded since Feb. 1, 1943. Stocks of refined lead held steady at 13,932 tons as of Feb. 1, compared with 13,866 tons as of Jan. 1, while those of antimonial lead declined to 6684 tons from 7921.

The tight world lead supply situation was aggravated further last week when a strike of workers resulted in the closing of the San Luis Potosi lead-copper smelter of the American Smelting & Refining Co. in Mexico. Previously, a strike had closed the company's big lead refinery at Monterrey.

ZINC — Supply of zinc continues tight and no relief is foreseen by trade interests for at least a year. Operations are hampered by a shortage of workers in the southwest where there is an acute shortage of adequate housing facilities. The British government has ordered a reduction of 20 per cent in the amount of zinc that may be used in the United Kingdom for galvanizing purposes. The reduction, expected to result in a saving of about 15,000 long tons a year, was ordered because the shortage of dollars prevented importation of adequate tonnages.

TIN — World stocks of tin and tin in concentrates (including afloats but exclusive of some 12,000 tons in the United States permanent stockpile) totaled about 121,600 tons on Dec. 31, 1947, compared with 138,000 tons at the end of 1946. Of the total at the end of last year, 65,550 tons were in the United States, 17,600 tons in United Kingdom, 5600 in the Netherlands, 5300 in the Netherlands East Indies, 4330 tons in Malaya, 3700 tons in Belgium, and 19,500 tons in other countries.

Reconstruction Finance Corp. has purchased 838 tons of pig tin to apply against the interim allocation of 10,200 tons to the United States for the first half of 1948.

Office of Metals Reserve stocks of tin declined 588 tons in February to a total of 27,086 tons.

ALUMINUM — Permanente Metals Corp. has awarded contracts to United Engineering & Foundry Co., Pittsburgh, for construction of machinery for a rod and bar mill at Spokane, Wash. The mill will be capable of processing over 60,000 tons of metal a year and will produce bars up to a 2-inch maximum and rods in all sizes from 3/8-inch to 7/8-inch diameter. Start of production is scheduled for April, 1949.

NONFERROUS METAL PRICES

Copper: Electrolytic, carloads 21.50c, delivered Conn.; Lake, 21.62½c del. Conn. Dealers may add ¾c for 5000 lb to carload; 1c 1000-4999 lb; 1½c, 500-999 lb; 2c 0-499 lb. Casting, nom., refinery, 20,000 lb or more; nom., less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 19.00-19.25c; 88-10-2 (No. 215) 28.00c; 80-10-10 (No. 305) 24.25c; No. 1 yellow (No. 405) 15.00-16.00c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than carloads.

Zinc: Prime western 12.00c, brass special 12.25c, intermediate 12.50c, E. St. Louis; high grade 13.00c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb 0.4c; under 2000 lb 0.50c.

Lead: Common 14.80c-14.85c, chemical 14.90c, corroding 14.90c, E. St. Louis for carlots.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 16.50-16.75; No. 12 foundry alloy (No. 2 grade) 16.25-16.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 16.50-17.00c; grade 2 (92-95%) 16.00-16.50c; grade 3 (90-92%) 15.75-16.00c; grade 4 (85-90%) 15.25-15.50c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, about 20 lb), 10,000 lb and over, 20.50c, fob Freeport, Tex.; 2000 to 9999 lb, 21.50c; 100 to 1999 lb, 22.50c. Extruded rounds, 12 inches long, 1.312 inches in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb. 42.00-46.00c; 100 to 4000 lb, 35.00-36.00c.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (including Straits), 94.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 93.85c; Grade C, 99.65-99.79% incl. 93.50c; 99.00-99.64% 93.50c and 98.00-98.99%, 92.60c for tin content.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 33.00c; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 33.50c. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 224-999 lb; add 2c for 223 lb and less; on sales by dealers, distributors, and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked 33.75c lb; 25 lb pigs produced from electrolytic cathodes 35.25c lb; shot produced from electrolytic cathodes 36.25c lb; "F" nickel shots or ingots for addition to cast iron 34.25c lb. Prices include import duty.

Mercury: Open market, spot, New York, $76-$78 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $20.50 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.75 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.80.

Cobalt: 97-98%, $1.65 lb for 550 lb (keg) $1.67 lb for 100 lb (case); $1.72 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y., 74.62½c, per ounce.

Platinum: $72-$75 per ounce.

Palladium: $24 per troy ounce.

Iridium: $95-$105 per troy ounce.

Rolled, Drawn, Extruded Products

Copper and brass product prices are fob mill, with freight prepaid on 200 lb or more.

Sheet: Copper 33.68c; yellow brass 30.16c; commercial bronze, 95% 33.80c, 90% 33.27c; red brass, 85% 32.23c, 80% 31.70c; best quality 31.09c; Everdur, Duronze, Herculoy or equiv., hot-rolled, 38.56c; nickel silver, 18%, 42.42c; phosphor bronze, grade A, 5%, 52.70c.

Rods: Copper, hot rolled 30.03c, cold drawn 31.03c; yellow brass, free cutting, 24.69c; commercial bronze, 95% 33.49c, 90% 32.96c; red brass, 85% 31.92c, 80% 31.39c; best quality 30.78c.

Seamless Tubing: Copper 33.72c; yellow brass 32.92c; commercial bronze 90% 35.68c; red brass 85% 34.89c, 80% 34.36c; best quality brass 33.50c.

Wire: Yellow brass 30.45c; commercial bronze, 95% 34.09c, 90% 33.56c; red brass, 85% 32.52c, 80% 31.99c; best quality brass 31.38c.

Copper Wire: Bare, soft, fob eastern mills, carlots 26.80c, less carlots 27.30c; weatherproof, fob eastern mills, carlots 27.35c, less carlots 27.85c; magnet, delivered, carlots 29.75c-31.13c, 15,000 lb or more 30.00c-31.38c, less carlots 30.50c-31.88.

Aluminum Sheets and Circles: 2s and 3s mill finish; base price, cents per pound, 30,000 lb or more, bulk or skid packing, fob shipping point. Transportation allowance: Actual transportation charges not exceeding the rail freight rate applicable to shipments of 30,000 lb are deducted on shipments of 500 lb or more.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	24.0	...	...
0.135-0.126	12-48	24.5	...	...
0.125-0.096	12-48	24.5	23.1	26.3
0.095-0.077	12-48	25.0	23.2	26.5
0.076-0.061	12-48	25.5	23.4	26.7
0.060-0.048	12-48	25.7	23.6	27.0
0.047-0.038	12-48	26.1	23.8	27.3
0.037-0.030	12-48	26.4	24.1	27.7
0.029-0.024	12-48	26.8	24.4	28.1
0.023-0.019	12-36	27.4	24.8	28.6
0.018-0.017	12-36	27.9	25.3	29.3
0.016-0.015	12-36	28.6	25.9	30.1
0.014	12-24	29.4	26.6	31.1
0.013-0.012	12-24	30.2	27.3	32.0
0.011	12-24	31.1	28.1	33.1
0.010-0.0095	12-24	32.1	29.0	34.3
0.009-0.0085	12-20	33.2	30.0	35.7
0.008-0.0075	12-20	34.4	31.1	37.1
0.007	12-18	35.7	32.3	38.8
0.006	12-18	37.0	33.5	42.6

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Lead Products: Prices to jobbers, fob Cleveland, Pittsburgh: Sheets, full rolls, 140 sq ft or more, 18.35c per cwt.; add 50c per cwt., 10 sq ft to 140 sq ft; $1.25, less than 10 sq ft; $1, circles and segments.
Pipe: Full coils, 17.60c per cwt; cut coils, 17.85c.
Lead Traps and Bends: List price plus 42%.

Zinc Products: Sheet, 16.50c-17.00c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 15.25c-16.00c, fob mill, 36,000 lb and over. Plates, not over 12-in., 14.25c; over 12-in., 15.25c.

Plating Materials

Chromic Acid: 99.75%, flake, fob Philadelphia, carloads, 22.00c; 5 tons and over 22.50c; 1 to 5 tons, 23.00c; less than 1 ton, 23.50c.

Copper Anodes: Base, 2000 to 5000 lb; fob shipping point, freight allowed: Flat untrimmed, 30.59c; oval, 30.09c; electrodeposited, 29.84c; cast, 29.59c.

Copper Carbonate: 52-54% metallic Cu; 50 lb bags, 25.00c fob Cleveland.

Copper Cyanide: 70-71% Cu, 100-lb drums, 45.00c fob Cleveland.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15.00c, fob Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c, 3000 to 10,000 lb, 50.00c; 500 to 3000 lb. 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 23.50c; 275-lb, or 500 bbls. 21.50c, fob Cleveland.

Tin Anodes: Bar, 1000 lb and over 110.00c; 500 to 1000 lb, 110.50c; 200 to 5000 lb, 111.00c; less than 200 lb, 112.50c; ball, 1000 lb and over, 112.25c; 500 to 1000 lb. 112.75c; 200 to 500 lb, 113.25c; less than 200 lb, 114.75c, fob Sewaren, N. J.

Tin Chloride: Fob Grasselli, N. J., 625 lb bbls., price on application.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers and resellers, 67.4c; 100 or 300 lb drums only, 100 to 500 lb, to consumers 59.2c, to resellers 54.8c; 600 to 1900 lb, to consumers 56.8c, to resellers 52.5c; 2000 to 9900 lb, to consumers 55.0c, to resellers 50.9c; 10,000 lb or more l.c.l., to consumers 53.9c, to resellers 49.9c; carloads, to consumers 52.7c, to resellers 48.7c. Prices fob Sewaren, N. J.

Zinc Cyanide: 100-lb drums 36.00c, fob Cleveland or Detroit; 35.00, fob Philadelphia.

Scrap Metals

BRASS MILL ALLOWANCES

(Based on 21.50c, Conn., for copper)
Prices for less than 15,000 lb fob shipping point. Add ¾c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	19.125	19.125	18.375
Yellow brass	15.625	15.375	14.750
Commercial Bronze			
95%	18.125	17.875	17.375
90%	17.625	17.375	16.875
Red brass			
85%	17.500	17.250	16.750
80%	17.250	17.000	16.500
Best Quality (71-79%)	16.625	16.375	15.875
Muntz Metal	14.750	14.500	14.000
Nickel silver, 5%	16.500	16.250	8.250
Phos. bronze, A. B.	20.750	20.500	19.500
Naval brass	15.250	15.000	14.500
Manganese bronze	15.250	15.000	14.375

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 17.50, No. 2 copper 16.50, light copper 15.50, composition red brass 14.25, auto radiators 11.25, heavy yellow brass 10.25-10.50, brass pipe 11.25.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 18.25, No. 2 copper 17.25, light copper, 16.25, refinery brass (60% copper), per dry copper content 15.75.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 16.00-16.50, No. 2 15.00-15.50, light copper 14.00-14.25, No. 1 composition red brass 11.50-12.00, No. 1 composition turnings 11.00-11.50, mixed brass turnings 7.00-7.25, new brass clippings 12.50-13.00, No. 1 brass rod turnings 10.00-10.50, light brass 6.00-6.25, heavy yellow brass 8.25-8.50, new brass rod ends 10.50-11.00, auto radiators, unsweated 9.25-9.50, cocks and faucets 9.25-9.50, brass pipe 9.00-9.25.

Lead: Heavy 13.50-14.00, battery plates 7.25-7.50, linotype and stereotype 14.50-15.00, electrotype 12.00-12.50, mixed babbitt 13.50-14.00, solder joints 16.50-17.00.

Zinc: Old zinc 5.50-5.75; new die cast scrap 4.75-5.25, old die cast scrap 2.75-3.25.

Tin: No. 1 pewter 60.00-62.00, block tin pipe 77.00-78.00, auto babbitt 45.00-47.00, No. 1 babbitt 45.00-48.00, siphon tops 45.00-47.00.

Aluminum: Clippings 2S 9.00-9.50, old sheets 7.00-7.50, crankcases 7.00-7.50, borings and turnings 2.50-3.00, pistons, free of struts, 6.00-6.50.

Nickel: Anodes 16.00-17.00, turnings 12.50-13.00, rod ends 16.00-17.00.

Monel: Clippings 12.00-12.50, turnings 7.00-7.25, old sheets 10.00-10.50, rods 10.00-10.50, castings 9.00.

DAILY PRICE RECORD

	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
January Average:	21.500	14.825	11.056	94.000	15.000	33.000	33.750	74.625
Feb. Average ..	21.500	14.825	12.000	94.000	15.000	33.000	33.750	74.625
Mar. 1-18	21.500	14.80–14.85	12.000	94.000	15.000	33.000	33.750	74.625

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, fob Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery, unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

OPEN MARKET PRICES, IRON AND STEEL • SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Heavy Melt. Steel	$40.00-40.50*
No. 2 Heavy Melt. Steel	40.00-40.50*
No. 1 Busheling	40.00-40.50*
Nos. 1, 2 & 3 Bundles	40.00-40.50*
Machine Shop Turnings	35.50-36.00
Mixed Borings, Turnings	35.50-36.00
Short Shovel Turnings	36.00-37.00
Cast Iron Borings	36.00-37.00
Bar Crops and Plate	47.50-48.00
Low Phos. Steel	47.50-48.00
Heavy Turnings	40.00-40.50

Cast Iron Grades

No. 1 Cupola	64.00-65.00
Charging Box Cast	48.00-49.00
Heavy Breakable Cast	48.00-49.00
Unstripped Motor Blocks	52.00-53.00
Malleable	69.00-70.00
Brake Shoe	52.00-53.00
Clean Auto Cast	58.00-59.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	41.00-41.50
R.R. Malleable	75.00-80.00
Axles	51.50-52.00
Rails, Rerolling	56.00-57.00
Rails, Random Lengths	58.00-59.00
Rails, 3 ft and under	60.50-61.00
Rails, 18 in. and under	61.50-62.00
Railroad Specialties	54.00-55.00
Uncut Tires	52.00-52.50
Angles, Splice Bars	53.00-54.00

*Plus applicable freight springboard.

CLEVELAND

No. 1 Heavy Melt. Steel	$39.50-40.00*
No. 2 Heavy Melt. Steel	39.50-40.00*
No. 1 Busheling	39.50-40.00*
Nos. 1 & 2 Bundles	39.50-40.00*
Machine Shop Turnings	34.50-35.00
Mixed Borings, Turnings	34.00-36.00
Short Shovel Turnings	35.50-36.00
Cast Iron Borings	35.50-36.00
Bar Crops and Plate	44.50-45.00
Punchings & Plate Scrap	44.50-45.00
Heavy Turnings	39.50-40.50
Alloy Free Turnings	37.50-38.50
Cut Structurals	46.00-49.00

*Plus applicable freight springboard.

Cast Iron Grades

No. 1 Cupola	68.00-70.00
Charging Box Cast	58.00-60.00
Stove Plate	58.00-60.00
Heavy Breakable Cast	54.00-56.00
Unstripped Motor Blocks	58.00-60.00
Malleable	73.00-78.00
Brake Shoes	52.00-53.00
Clean Auto Cast	68.00-70.00
No. 1 Wheels	58.00-60.00
Burnt Cast	56.00-57.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.50-41.50*
R.R. Malleable	73.00-78.00
Rails, Rerolling	57.00-58.00
Rails, Random Lengths	56.00-57.00
Rails, 3 ft and under	61.00-63.00
Cast Steel	56.00-58.00
Railroad Specialties	53.00-55.00
Uncut Tires	56.00-57.00
Angles, Splice Bars	57.00-59.00

*Plus applicable freight spring board.

VALLEY

No. 1 Heavy Melt. Steel	40.00-40.50*
No. 2 Heavy Melt. Steel	40.00-40.50*
No. 1 Bundles	40.00-40.50*
Machine Shop Turnings	34.50-35.50
Short Shovel Turnings	36.50-37.00
Cast Iron Borings	36.00-36.50
Low Phos.	46.00-47.50

* Plus applicable freight springboard.

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.50-41.50*

*Plus applicable freight spring board.

MANSFIELD

Machine Shop Turnings	$35.00-35.50
Short Shovel Turnings	37.00-37.50

CINCINNATI

No. 1 Heavy Melt. Steel	$39.50
No. 2 Heavy Melt. Steel	39.50
No. 1 Busheling	39.50
Nos. 1 & 2 Bundles	39.50
Machine Shop Turnings	33.50
Mixed Borings, Turnings	32.50
Short Shovel Turnings	35.50
Cast Iron Borings	34.50

Cast Iron Grades

No. 1 Cupola Cast	55.00
Charging Box Cast	43.00
Heavy Breakable Cast	50.00
Stove Plate	47.00
Unstripped Motor Blocks	45.00
Brake Shoes	45.00
Clean Auto Cast	55.00
Drop Broken Cast	60.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.50
R.R. Malleable	68.00
Rails, Rerolling	53.00
Rails, Random Lengths	50.00
Rails, 18 in. and under	60.00

DETROIT

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$35.00-35.50
No. 1 Busheling	35.00-35.50
Nos. 1 & 2 Bundles	35.00-35.50
No. 3 Bundles	35.00-35.50
Machine Shop Turnings	29.00-29.50
Mixed Borings Turnings	29.00-29.50
Short Shovel Turnings	30.00-30.50
Cast Iron Borings	30.00-30.50
Punchings & Plate Scrap	40.00-40.50

Cast Iron Grades

No. 1 Cupola Cast	60.00-62.00
Heavy Breakable Cast	50.00-52.00
Clean Auto Cast	62.00-65.00

BUFFALO

No. 1 Heavy Melt. Steel	$43.00-45.00
No. 2 Heavy Melt. Steel	39.75-40.25
No. 1 Busheling	39.75-40.25
No. 1 & 2 Bundles	39.75-40.25
Machine Shop Turnings	34.75-35.25
Mixed Borings, Turnings	34.75-35.25
Cast Iron Borings	35.75-36.26
Short Shovel Turnings	36.75-37.25
Low Phos.	46.00-47.00

Cast Iron Grades

No. 1 Cupola	60.00-62.00
Mixed Cupola	58.00-60.00
Heavy Breakable Cast	55.00-57.00
Malleable	70.00-75.00
Clean Auto Cast	62.00-64.00

Railroad Scrap

Rails, 3 ft. and under	56.00-58.00
Railroad Specialties	52.00-53.00

PHILADELPHIA

No. 1 Hvy. Melt. Steel	$41.50
No. 2 Hvy. Melt. Steel	39.00
No. 1 Busheling	39.00
Nos. 1 & 2 Bundles	39.00
No. 3 Bundles	37.00
Machine Shop Turnings	34.00-35.00
Mixed Borings, Turnings	34.00-35.00
Short Shovel Turnings	34.00-35.00
Bar Crop and Plate	44.50-45.50
Punchings & Plate Scrap	44.50-45.50
Cut Structurals	44.50-45.50
Elec. Furnace Bundles	43.50-44.50
Heavy Turnings	42.50-43.00
No. 1 Chemical Borings	42.00-43.00

Cast Iron Grades

No. 1 Cupola Cast	64.00-65.00
No. 1 Machinery Cast	66.00-67.00
Charging Box Cast	60.00-61.00
Heavy Breakable Cast	60.00-61.00
Unstripped Motor Blocks	61.50-62.50
Malleable	74.00-76.00
Clean Auto Cast	64.00-65.00
No. 1 Wheels	67.00-68.00

NEW YORK

(Brokers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$34.03
No. 2 Heavy Melt. Steel	34.03
No. 1 Busheling	34.03
Nos. 1 & 2 Bundles	34.03
No. 3 Bundles	32.03
Machine Shop Turnings	28.50-29.00
Mixed Borings, Turnings	28.50-29.00
Short Shovel Turnings	30.50-31.00
Punchings & Plate Scrap	39.00-40.00
Cut Structurals	39.00-40.00
Elec. Furnace Bundles	39.00-40.00

Cast Iron Grades

No. 1 Cupola Cast	58.00-60.00
Charging Box Cast	55.00-57.00
Heavy Breakable	55.00-57.00
Unstripped Motor Blocks	52.00-54.00
Malleable	68.00-69.00

BOSTON

(Fob shipping point)

No. 1 Heavy Melt. Steel	$31.40-31.90
No. 2 Heavy Melt. Steel	31.40-31.90
No. 1 Bundles	31.40-31.90
No. 1 Busheling	31.40-31.90
Machine Shop Turnings	26.90
Mixed Borings, Turnings	27.00-28.00
Short Shovel Turnings	28.90
Bar Crops and Plate	37.00
Punchings & Plate Scrap	37.00
Chemical Borings	34.00-35.00

Cast Iron Grades

No. 1 Cupola Cast	55.00-60.00
Heavy Breakable Cast	53.00-55.00
Stove Plate	50.00-52.00
Unstripped Motor Blocks	40.00-41.00
Clean Auto Cast	48.00-50.00

CHICAGO

No. 1 Heavy Melt Steel	$38.50-39.50
No. 2 Heavy Melt. Steel	37.00-37.50
No. 1 Bundles	38.50-39.50
No. 2 Bundles	37.00-37.50
No. 3 Bundles	35.00-35.50
Machine Shop Turnings	33.50-34.50
Mixed Borings, Turnings	33.50-34.50
Short Shovel Turnings	35.50-36.50
Cast Iron Borings	34.50-35.50
Bar Crops and Plate	46.00-47.00
Punchings	47.50-48.50
Elec. Furnace Bundles	39.50-40.50
Heavy Turnings	38.00-39.00
Cut Structurals	43.50-44.50

Cast Iron Grades

No. 1 Cupola Cast	65.00-67.00
Clean Auto Cast	65.00-67.00
No. 1 Wheels	53.00-56.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	41.25-41.75
Malleable	70.00-71.00
Rails, Rerolling	49.00-50.00
Rails, Random Lengths	46.50-47.50
Rails, 3 ft and under	55.00-56.00
Rails, 18 in. and under	57.00-58.00
Railroad Specialties	49.00-50.00
Angles, Splice Bars	50.00-51.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$39.50-40.50
No. 2 Heavy Melt. Steel	37.50-38.50
Machine Shop Turnings	32.50-33.50
Short Shovel Turnings	34.50-35.50

Cast Iron Grades
(Fob shipping point)

No. 1 Cupola Cast	65.00-67.00
Mixed Cast	60.00-62.00
Heavy Breakable Cast	53.00-55.00
Brake Shoes	54.00-55.00
Clean Auto Cast	64.00-66.00
Burnt Cast	58.00-59.00

Railroad Scrap

R.R. Malleable	65.00-70.00
Rails, Rerolling	50.50-52.50
Rails, Random Lengths	49.50-51.50
Rails, 3 ft and under	53.00-55.00
Uncut Tires	46.00-47.00
Angles, Splice Bars	46.00-48.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$37.00
No. 2 Heavy Melt. Steel	37.00
No. 1 Busheling	37.00
Nos. 1 & 2 Bundles	37.00
No. 3 Bundles	31.00
Long Turnings	24.50
Short Shovel Turnings	26.00-27.00
Cast Iron Borings	25.00
Bar Crops and Plate	38.50
Cut Structurals	38.50

Cast Iron Grades

No. 1 Cupola Cast	51.00
Stove Plate	43.00
No. 1 Wheels	45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	38.00
R.R. Malleable	45.00
Axles, Steel	39.00
Rails, Rerolling	52.00
Rails, Random Length	39.00
Rails, 3 ft and under	41.00
Angles and Splice Bars	41.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*$25.00
No. 2 Heavy Melt. Steel	*25.00
No. 1 Busheling	*25.00
Nos. 1 & 2 Bundles	*25.00
No. 3 Bundles	*20.00
Machine Shop Turnings	*15.50
Bar Crops and Plate	25.00
Cast Steel	25.00
Alloy Free Turnings	15.50
Cut Structurals	25.00
Tin Can Bundles	20.00

Railroad Scrap

No. 1 Heavy Melting	26.00
Axles	32.00
Rails, Random Lengths	26.50
Uncut Tires	33.50

* Fob California shipping point.

SEATTLE

No. 1 Heavy Melt. Steel	$24.00-28.00
No. 2 Heavy Melt. Steel	24.00-28.00
No. 1 Busheling	24.00-28.00
Nos. 1 & 2 Bundles	22.00-23.00
No. 3 Bundles	22.00-23.00
Machine Shop Turnings	14.50-16.50
Mixed Borings, Turnings	14.50-16.50
Punchings & Plate Scrap	26.00-28.00
Cut Structurals	26.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	40.00
Charging Box Cast	25.00
Heavy Breakable Cast	24.00
Stove Plate	25.50
Unstripped Motor Blocks	24.00
Malleable	30.00
Brake Shoes	30.00
Clean Auto Cast	30.00
No. 1 Wheels	26.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	22.00
Railroad Malleable	30.00
Rails, Random Lengths	21.50
Angles and Splice Bars	23.00

LOS ANGELES

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	25.00
Nos. 1 & 2 Bundles	25.00
Machine Shop Turnings	16.00
Mixed Borings, Turnings	15.50-16.00
Punchings & Plate Scrap	28.00
Elec. Furnace Bundles	28.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00

HAMILTON, ONT.

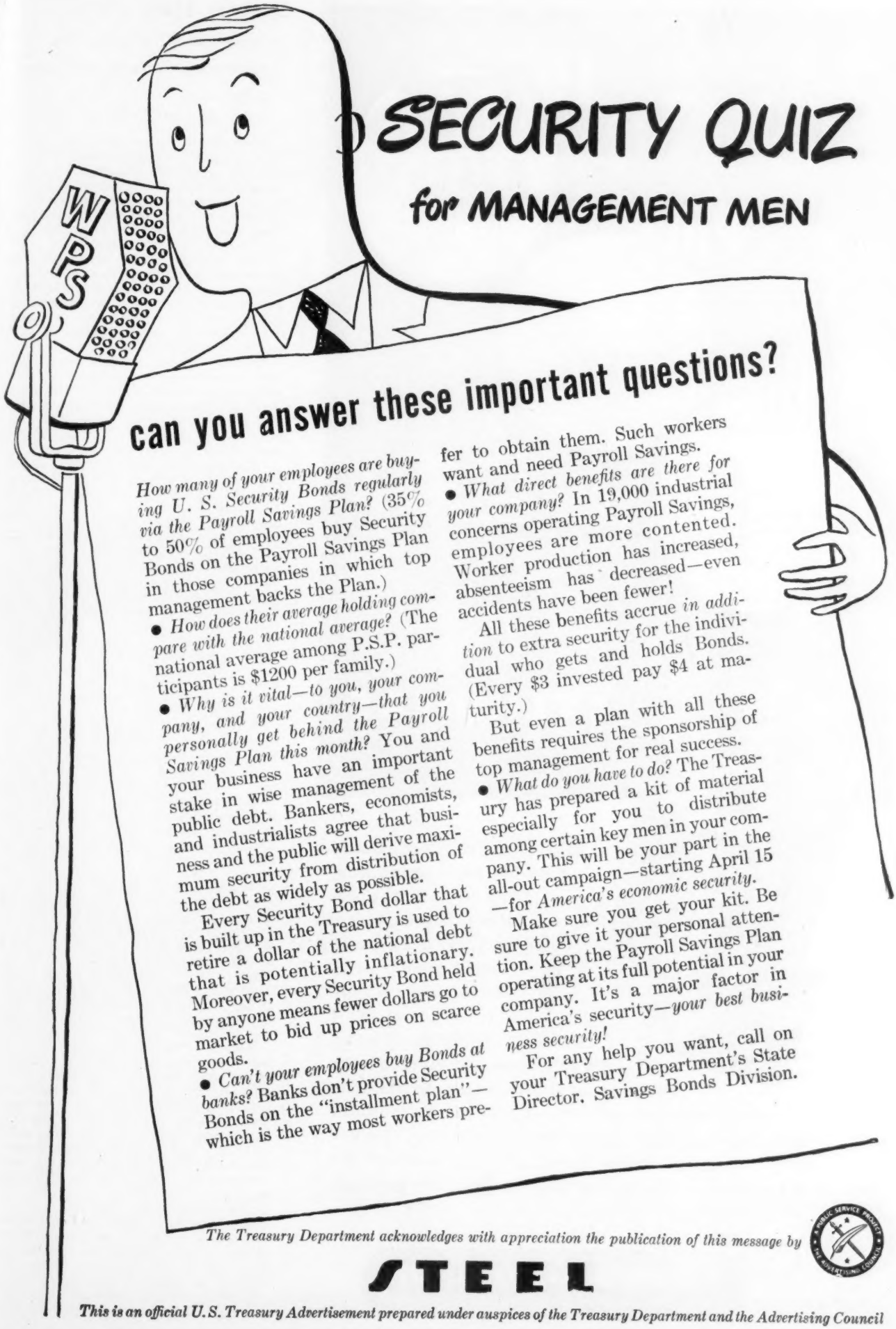
(Ceiling prices, delivered)

Heavy Melting	$22.00
No. 1 Bundles	22.00
Mechanical Bundles	20.00
Mixed Steel Scrap	19.00
Mixed Borings, Turnings	17.00
Rails, Remelting	28.00
Rails, Rerolling	26.00
Bushelings	17.00
Bushelings, new factory, prep'd	21.00
Bushelings, new factory, unprep'd	16.00
Short Steel Turnings	17.00

Cast Iron Grades*

No. 1 Cast	42.00-48.00
No. 2 Cast	35.00-37.00

* Removed from price control Aug. 9, 1947; quoted on basis of fob shipping point.



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for MANAGEMENT MEN

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• *How does their average holding compare with the national average?* (The national average among P.S.P. participants is $1200 per family.)

• *Why is it vital—to you, your company, and your country—that you personally get behind the Payroll Savings Plan this month?* You and your business have an important stake in wise management of the public debt. Bankers, economists, and industrialists agree that business and the public will derive maximum security from distribution of the debt as widely as possible.

Every Security Bond dollar that is built up in the Treasury is used to retire a dollar of the national debt that is potentially inflationary. Moreover, every Security Bond held by anyone means fewer dollars go to market to bid up prices on scarce goods.

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• *What direct benefits are there for your company?* In 19,000 industrial concerns operating Payroll Savings, employees are more contented. Worker production has increased, absenteeism has decreased—even accidents have been fewer!

All these benefits accrue *in addition* to extra security for the individual who gets and holds Bonds. (Every $3 invested pay $4 at maturity.)

But even a plan with all these benefits requires the sponsorship of top management for real success.

• *What do you have to do?* The Treasury has prepared a kit of material especially for you to distribute among certain key men in your company. This will be your part in the all-out campaign—starting April 15—for *America's economic security.*

Make sure you get your kit. Be sure to give it your personal attention. Keep the Payroll Savings Plan operating at its full potential in your company. It's a major factor in America's security—*your best business security!*

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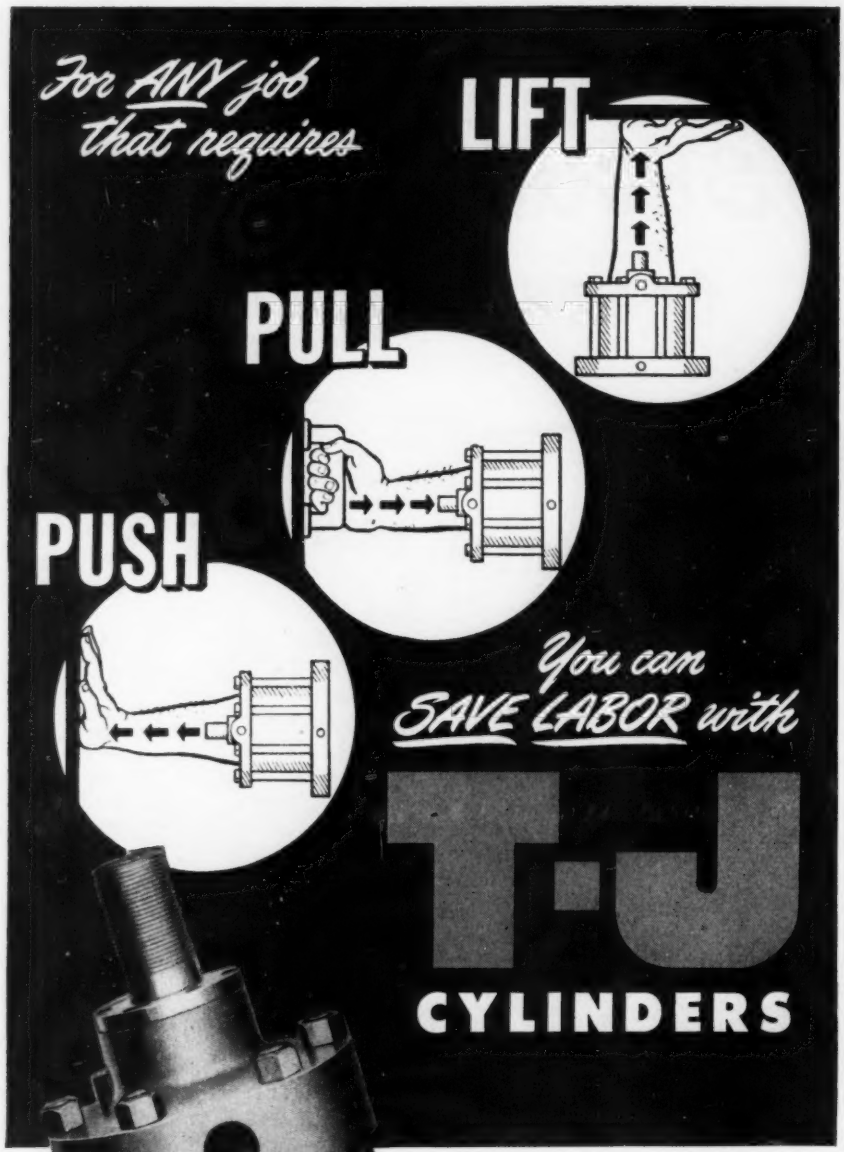

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Sheets, Strip . . .

Acme Steel rescinds Feb. 25 advance in hot and cold-rolled strip

Sheet Prices, Page 122

Chicago — Acme Steel Co., this city, rescinded, effective Mar. 17, its advance, of $6 and $8 per ton respectively, on hot and cold-rolled strip which had been put into effect on Feb. 25. Statement to the company's customers, signed by Carl J. Sharp, executive vice president, said:

"On Feb. 25, 1948, we advanced prices on hot and cold strip. Our reason for this increase in price is well known to all in view of the extensive publicity given to the raise in prices of semifinished steel, which is our basic raw material.

"Heretofore any increase in semifinished steel has been reflected in upward adjustments of further finished steel products such as strip, sheet, plates and bars. Our price advances were in contemplation that the previous pattern of practice would prevail.

"The fact that up to this date there has been no increase in the price announced by other producers servicing this area leaves us in the untenable position of requiring our customers to pay us a premium for our steel.

"Regardless of the fact that our increased costs justify the advance in our prices, and with full appreciation of the willingness of our customers to pay these increases, we feel that it would be contrary to our concept of fair play in business relationships to permit this situation to continue. Effective this date (Mar. 17), we are withdrawing the price increase announced Feb. 25 on hot and cold-rolled strip steel."

New York — Sheet consumers expect a severe shortage in supply for some time to come. Assuming an early settlement in the soft coal dispute, no further major labor disruptions, and no untoward international developments, sheet production from now on should be on a better scale. Though second quarter quotas are no larger, or even as heavy in some instances, the overall movement of sheets should be better than in the current period. However, the various uncertainties are making it difficult for consumers to plan ahead with assurance, and even though developments may prove favorable all along the line, there is no question but what supply will fall short of actual needs. In some consumer products, especially household appliances, supply is coming in closer balance with demand.

Boston — Volume of hot-rolled carbon sheets will be lower next quarter, some mills including no tonnage in allocations. Cold-rolled quotas are held to a minimum of estimated production, any increase being dependent on odds and ends. Numerous users of sheets are employing a larger ratio of cold-rolled than normally, substituting for various hot-rolled grades and enameling. Other specialties, including high-tensile low-alloy steels, also enter the substitution situation. Third quarter allocation of electrical sheets is being made, the increase in capacity in one instance being reflected in heavier offerings. Most consumers of flat-rolled steel are taking up full quotas next quarter and

many could use more. Demand for tack plate is active and another eastern mill is considering the rolling of that item. Demand for shank steel is easier while that for stainless and alloys is the heaviest in months. Some 100 polished stainless steel is being sold by one supplier at the price of unpolished, which in effect is a price concession.

Pittsburgh — There are no indications of sheet order hold-ups or cancellations despite rumors that household appliances are accumulating at distribution outlets. In a few instances purchasing agents are more cautious, but this change in buying policy has been restricted to exorbitant priced steel obtained through ingot conversion deals. However, for most sheet and strip consumers the steel and component supply situation remains the major production bottleneck. No significant improvement in the present tight supply-demand situation through most of this year is expected, despite installation of new cold-reduction facilities and speed-up programs.

Cleveland — Amid considerable puzzlement as to the future for business and industrial activity in view of growing domestic and international problems, the extreme pressure for steel, even sheets and strip, was less apparent here last week.

Demand continues far in excess of supply but there was a noticeable absence at various steel company offices of personal and telephone calls from inquirers, particularly those who have been "beating the bushes" for any steel from any source.

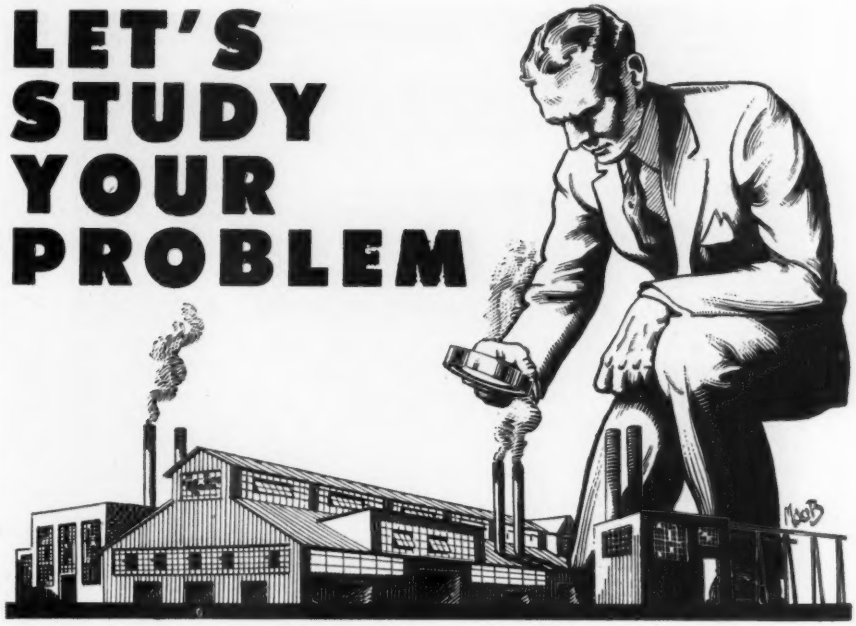
Although the coal strike threatened to make the steel shortage even more pronounced, Republic Steel Corp. continued according to schedule and issued district quotas for flat-rolled carbon steel for June delivery. By Apr. 15, district offices are to have completed allotment of these quotas.

Thomas Steel Co. Warren, O., has made upward revisions in extras on certain specialized coatings for cold-rolled strip steel. The adjustments, effective Mar. 15 and superseding a Jan. 15, 1948, list, affect the following coatings: Brass electro-coating, zinc, copper wash, and hot-dipped tinned or solder.

Cincinnati—Sheet mills here have set up second quarter allotments against a demand for tonnage which is as pressing as ever. Carryover, heaviest in hot-rolled and cold-rolled sheets, will run into several weeks of the second quarter schedules so that, in the final analysis, shipments rather than the quotas will determine the steel supply situation. Mill interests note that the coal miners' holidays, Army needs, or other factors may upset calculations.

Birmingham — Supplies of sheets are more stringent now than at the opening of the year and they may be tighter during the second quarter. Mills have not announced allocation plans for the second quarter which is not viewed as a good omen in many consuming quarters.

St. Louis — Demand for sheets shows no signs of abatement, while production continues at about 50 per cent of potential. Granite City Steel Co. is suffering adjustment difficulties with its new cold reduction mill and therefore is holding ingot production down to seven of 13 open hearths. Capacity operation is not expected for



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two months. Second quarter rolling schedules are filled with carryover and third quarter books have not been opened. Present lag in sheet deliveries may be aggravated if the limited tonnage going to Greece is ordered increased under ERP. Granite City Steel was allotted 3900 tons of plates under the new railway car program and expects to fill 2000 tons of it. All of the company's present plate tonnage is devoted to natural gas pipelines.

Tubular Goods . . .

Tubular Goods Prices, Page 123

Pittsburgh — At least two new interests are setting up pipe production facilities to help meet tremendous pent-up demand for large diameter line pipe. Sale of used equipment to interests in Texas for production of cement lined pipe also is reported. Expansion programs previously announced are progressing slowly, with delay in deliveries on many of key equipment facilities chief retarding factor. Production of electric weld tubing for overhead irrigation purposes is at an all time high. Sellers have not been able to make much headway this year against backlogs of nearly all pipe classifications. Alloy tubing and drill pipe are still fairly well extended. Threat of further disruption to production schedules as result of the walkout in coal mines has clouded the outlook.

In addition to price revisions put into effect by National Tube Co. Feb. 13, noted in Feb. 23 issue, the company is now quoting butt-weld line and standard pipe at Lorain, O., only. However, the company is meeting competition at Gary and Pittsburgh for size ranges produced at those centers.

Cleveland—While demand for cold-drawn and hot finished mechanical and pressure tubing has been at a high peak for some time, an even stronger tone is noted by one producer. This company reports its books for these products is filled through September and it is not accepting fourth-quarter business. With the further strengthening of demand, some buyers have been attempting to turn to the higher-priced seamless and alloy tubing and pipe as substitutes.

Seattle — Cast iron pipe agencies are handicapped by inability of mills to make deliverlies in less than 24 months and no immediate improvement is seen. For this reason competing types of pipe have been purchased for a number of projects in this area.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 122

Chicago — New construction jobs are coming out a little faster than recently, boosting demand for reinforcing steel. However, present demand already exceeds supply by a wide margin, and it is probable that a good part of new inquiry will not be accommodated. A sizable part of new work is for bridges, dams and flood protection. Concrete bar suppliers also report a substantial volume of small jobs which involve only a few tons each.

Preminum Market

Stampede to get steel at any price is lessening. Prices tend downward

Pittsburgh—There is little tangible evidence that an early balancing of carbon steel supply and demand is developing. However, the postwar stampede to get steel at any price appears likely to become more orderly during the last half of the year.

There is a growing tendency among buyers not to pay the first asking price, reported in STEEL, Mar. 1, p. 62. Greater caution is noted on the part of purchasing agents whose companies' products are running into stiffer sales resistance. This situation has dampened purchasing agents' enthusiasm in lining up ingot conversion deals which have resulted in some instances in payment of over $300 a ton for cold-rolled sheets.

Plain hot-rolled carbon sheets are bringing anywhere from $175 to $190 a ton on ingot conversion deals, in contrast to $215 to $225 six months to a year ago. Hot-rolled annealed sheets, pickled and oiled, today bring from $200 to $225 in open market transactions, against over $300 a few months ago; while cold-rolled sheets are available within the price range of $225 to $240, compared with over $300 formerly. There appears to be a greater tonnage of cold-rolled sheets than of hot-rolled sheets developing out of ingot conversion transactions.

Nails bring $8 to $10 a keg, off $3 to $4 from price peak of recent months. Butt weld line pipe open market price quotations have held up better than any single steel product, with sales any where from $190 to $230 a ton; galvanized grades normally have taken a 20 per cent premium price.

The above price ranges for finished steel items resulting from ingot conversion deals are said to represent monthly contract commitments for specific tonnages.

Detroit—With evidence mounting that purchasers of premium-price steel are retreating from the market and that conversion activity is subsiding due to scheduling and shipping difficulties, those who last fall were predicting two more years of critical steel shortage are retiring in confusion. Mills in this area still are besieged with demands from would-be buyers for tonnage, but take a philosophical view of the situation and try to distribute their production as equitably as possible. One plant reports a regional sales office was approached recently by representatives of the Treasury Department for a list of all customers and their purchases over the past year. Presumably the information was being sought for investigation of gray market activity. The request was refused.

Chicago—While gray market demand still holds strong, those who patronize it are not so eager to pay former high prices. Some of the gray market buyers, who were forced to acquire this material to stay in business, report they are making some progress in getting space on mill books.

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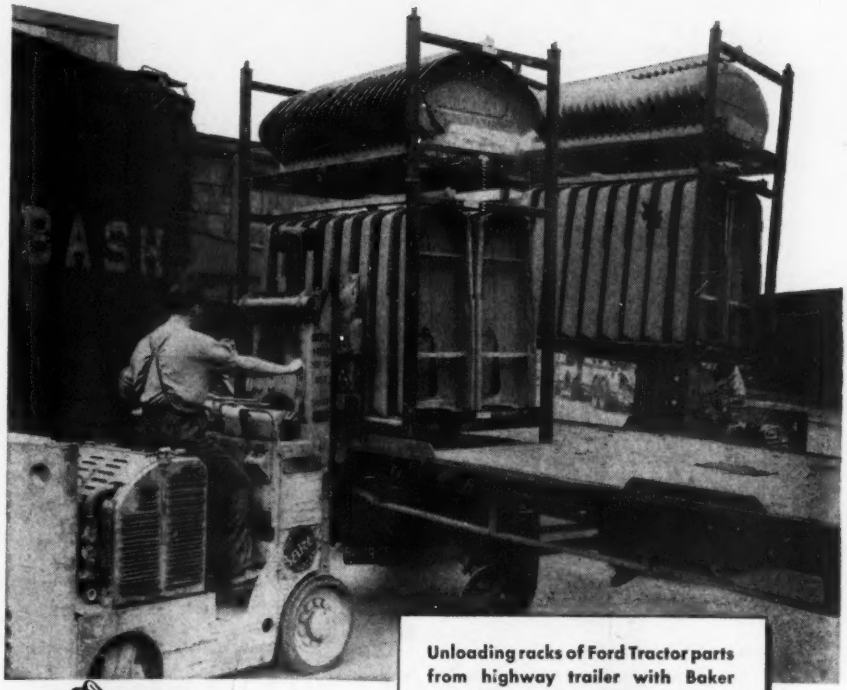

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Steel Bars . . .

Bar Prices, Page 122

New York — Small wide flats are in tightest supply of all the hot carbon bar products. Mill shipments are far behind schedule but may improve slightly in the second quarter. More favorable weather, with a somewhat better supply of metallics, particularly scrap, should lead to improved mill output, it is believed.

Stringency in lesser degree is expected to continue in most sizes and forms of hot carbon bars. Much concern is being expressed over the international situation. If this becomes worse, an entirely new appraisal of the outlook will be necessary with the stringency becoming even greater.

Boston — Effect of revisions by several mills of freight car and railroad distribution on carbon steel bars is reflected in somewhat lower allocations to other consumers. Those taking on added tonnage for railroads reduce volume to other users in proportion. However, through a slackening in cold-drawn bar demand, one mill is offering more hot-rolled carbon tonnage. On the whole, however, demand for cold-drawn is strong here, notably for screw machine parts. Forgers need more of some sizes and grades than are included in second quarter allocations and the same holds true for bolt and nut shops. Demand for alloys holds at the recently improved level.

Cleveland — Demand for alloy bars continues active, deliveries generally extending now into July. Among various reasons advanced for the spurt in alloy business are increasing requirements, although still moderate, for military aircraft.

Although some of the increase in alloy bookings has been attributed to steel company insistence that purchasers of carbon steel also take a certain amount of alloy, it was pointed out here last week that purchasers, not the steel companies, are linking the two together. In numerous instances, it is reported, steel buyers are offering an attractive amount of alloy business to a steel company providing the steel company furnishes some carbon steel also.

Even the federal government apparently is pursuing this method, for an arsenal has been seeking to place an order for an entire heat of cold-drawn alloy bars, along with carbon steel plates, heavy hot-rolled carbon sheets, and galvanized sheets.

St. Louis — Merchant bars remain in extremely tight supply, with prospect they will become scarcer under the new government allotment program. Laclede Steel Co., for example, was given a 900-ton monthly quota for railway car construction and repair in the second quarter. If Laclede fills the order, it will be at the expense of other consumers unless it is allotted additional pig iron. At the moment it has the rolling space but not the materials.

Rails, Cars . . .

Track Material Prices, Page 123

Philadelphia — The largest distribution of freight car orders in recent months has just been completed by the Southern Pacific, involving 9200 cars.

Structural Shapes . . .

Structural Shape Prices, Page 123

New York — The lull in structurals over the past few weeks has given way to a fairly active situation here, both with respect to awards and inquiries, but substantial work is still being held up. Outstanding award involves 10,140 tons for a power house extension here by the Consolidated Edison Co. Pending inquiry includes seven 17-story apartments for the Governor Smith housing development on the lower east side of Manhattan for the City Housing Authority.

Likely to encourage building construction here was the formal conclusion last week of a wage stabilizing agreement, involving all but four of the building trade unions in the city.

Boston — Structural steel contracts are featured by the award of 31,000 tons of superstructure steel for the Mystic river bridge, this city. American Bridge Co. will fabricate 17,000 tons; Bethlehem Steel Co., 14,000 tons. Flooring will be redesigned for reinforced concrete, thus eliminating close to 727,000 square feet of steel grid flooring. Cost of the grid flooring advanced about 15 per cent shortly before estimates on this project went in. Interesting from a delivery standpoint is the award of 575 tons for an industrial structural, Waltham, Mass., promised in four months. Fabricating shops and warehouses are seeking heavier tonnages of plain material. Most surplus structural material has been absorbed and there is little tonnage now available from this source.

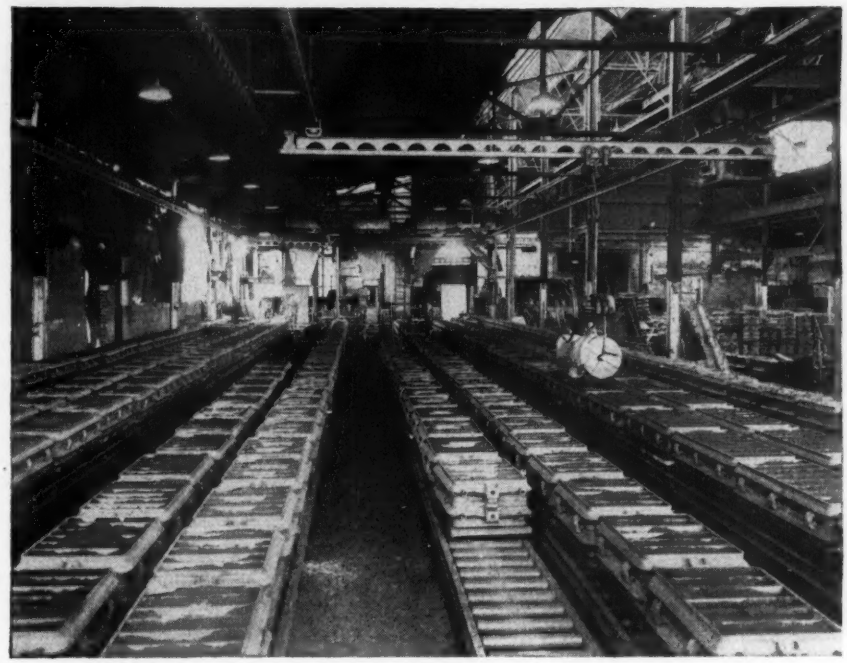
Philadelphia — Structural demand has gained, with a fair sprinkling of orders and a moderate broadening in inquiry, primarily for public work. Fabricators generally still have good backlogs, although somewhat less extended, and stringency in shapes continues to be noted. Production remains well short of shape rolling capacity, a situation ascribed principally to use of steel for other purposes.

The leading eastern producer has revised shape extras, as was previously indicated might be the case.

Chicago — Structural fabricators have from 6 to 9 months work ahead of them figured on present receipts of steel from mills. Beyond fourth quarter there is some speculation as to what is ahead for the industry, since building construction apparently has passed its peak. This is attributed more to the high cost of building than to declining need for building. In recent weeks, many jobs have come out for bids, only to be withdrawn when it is found that costs exceed estimates and appropriations by wide margins.

Birmingham — Structural activity here continues somewhat sluggish. Most fabricators, nevertheless, have reasonably good order backlogs but are looking to new contracts which may not be forthcoming until building costs in general show a substantial decline.

Seattle — Fabricators are contending with restricted supplies which apparently will be more acute in the second quarter than in the first. For this reason plants prefer to take jobs involving small tonnages and of this class of business there is a fair volume.



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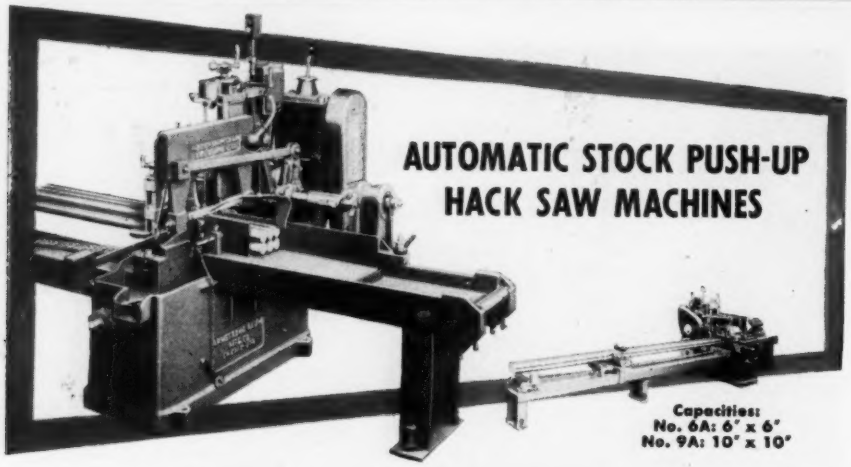

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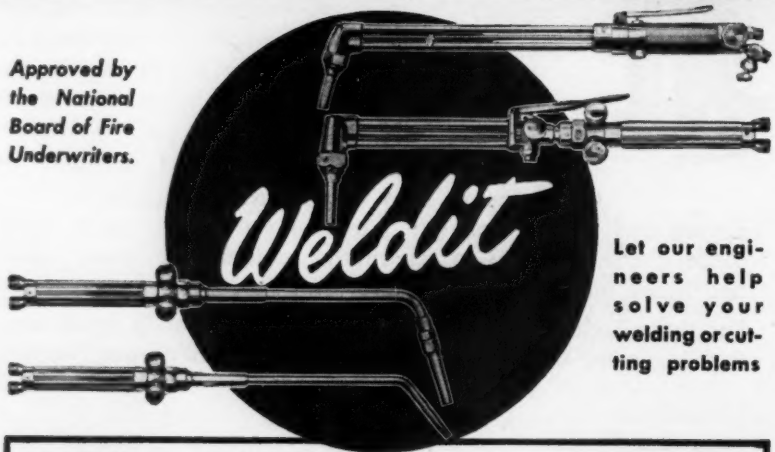

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Wire . . .

Wire Prices, Page 123

Pittsburgh — General pattern of demand for merchant and manufacturers' wire items has recorded little change in recent weeks. Pressure for deliveries of fine wire is well sustained, while that for coarse wire is exceptionally heavy. Large expansion of wire rope production facilities during the war is reflected in relatively easier mill delivery position on this item. Some slowing up in requirements for tire bead wire and for wire for bedding industry is noted. Heavy demand persists in nearly all types of drawn and spring wire items, cold heading wire being particularly scarce for the fastener trade. In most instances, jobber inventories of merchant wire items are unbalanced and well below normal. This is particularly true in nails.

Cleveland — Demand for wire and wire products shows no signs of slackening. With production having lost ground during recent industrial gas curtailments, consumers are clamoring all the more loudly for the currently available supply. In particularly heavy demand is upholstery wire, much of this pressure stemming from the high rate of automobile production and the resulting need for huge quantities of upholstery. Some open capacity exists, however, for various specialties, such as music wire.

In particularly heavy demand among merchant wire products are nails and barbed wire.

Indianapolis — Based on present costs, an increase of at least $5 a ton and up to $10 a ton is necessary on wire products, according to some small producers. An Indiana company is considering and probably will put into effect some increases in the near future.

Birmingham — Wire products are among items in shortest supply, the situation in nails being particularly acute. Wire processors could use, in most instances, from half again to double what they are getting, and demand for wire fencing has surged with the first spring weather. Mill schedules on wire are reported full, but the stock is not to be had.

Plates . . .

Plate Prices, Page 123

Boston — At least four delivered prices apply on plates covering a range up to $30 a ton between the lowest and highest. While this spread in plate costs has some influence on distribution for freight car building, surprisingly little consideration is given the matter of price by general consumers, most of whom appear anxious to secure tonnage regardless of price. Railroads on the other hand are reluctant to pay the premiums. This range of prices and selectivity in the acceptance of orders sustains confusion in plate distribution. Overall demand for plates is far in excess of supply. Floor plate and high-tensile low-alloy steel plate demand is strong, the former now being extended through July with some producers.

Philadelphia — Eastern plate producers are operating under more favorable conditions but arrearages in most cases are so heavy the effect is

scarcely noticeable on backlogs. Meanwhile, coal stoppages have threatened production and curtailment at eastern plants may come within a fortnight unless the miners' dispute is adjusted.

Birmingham — Plate consumers report absolutely no improvement in supplies. Some optimism was expressed that second quarter production would bolster available supplies, but the current coal strike has dispelled most of that. Plate users, therefore, look forward to continued shortages. Some sizable ship building and repair contracts on the Gulf Coast is accounting for considerable plate tonnage.

Seattle — Restricted operations at some plants is attributed to a steadily increasing shortage of plates. Fabricators are not interested in contracts involving large tonnages and are content in the circumstances to take only smaller jobs. Boiler and tank work is fairly active.

Tin Plate . . .

Tin Plate Prices, Page 123

Washington — Metal can shipments to packers of all types of products totaled a record-breaking 2,956,452 tons in 1947, says the Can Manufacturers Institute, this city. The previous peak output for a year was the 2,844,678 tons recorded during 1941.

Warehouse . . .

Warehouse Prices, Page 125

Philadelphia — Warehouse business remains active, with March sales likely to reach a new high level, probably being one of the best monthly records of the year. Sheets, shapes, and plates are particularly scarce. Hot carbon stocks are in fair balance. Cold-drawn and hot and cold alloy bars are in tighter supply at producing plants, but are still available in a wide range of sizes at distributors' warehouses. Among the flat-rolled items, perhaps the most scarce are corrugated galvanized sheets, with seasonal demand adding to the stringency.

Chicago — While warehouses are taking in as much steel each month as during 1947, customer demand is of such proportions that it is more difficult to maintain inventories. For some products, such as flat rolled, inventories are practically nil; for others, they are badly unbalanced. Small manufacturers find it takes a good deal of shopping around to satisfy their needs.

Cincinnati—Warehouses here are so short of plates and sheets that customers are taking any usable tonnage when prime stock is unavailable. Demand in other steel is also heavy, as indicated by the unusual round of shoppers seeking out material. Mill deliveries are unimproved, and inventories continue badly out of balance.

Seattle — Jobbing houses report a steady volume, in some instances as much as during the peak months of the war. Items in short supply are in worse position and no improvement in the sheet and plate markets is expected for many months. Export of 700,000 tons of plates for the Arabian oil supply line is blamed by some dealers for the critical situation of plates. Supplies of alloys, stainless items and cold-finished bars are somewhat easier. However, in the circumstances stocks are badly broken.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 124

Philadelphia — Beehive coke shipments in the East are being curtailed, and is beginning to be felt by the foundries. This coke has been drawn upon in this district in increasing quantities over recent weeks, due to shortage of oven coke, and even so most foundries have been able to accumulate little in the way of stocks. Hence, some consumers again are finding coke more of a bottleneck than pig iron.

Pittsburgh — Curtailment of coal mining has cut sharply into beehive coke production, with many ovens shut down. This situation is expected to be reflected immediately in curtailment of castings output here, for most foundries have less than a week's supply of coke on hand. Oven foundry coke operations were unaffected up to the close of last week, but it is questionable how long this will be the case, particularly that of the Clairton plant of U. S. Steel Corp., which is estimated to have had less than 15 days' supply at the time H. C. Frick Co.'s mines were closed.

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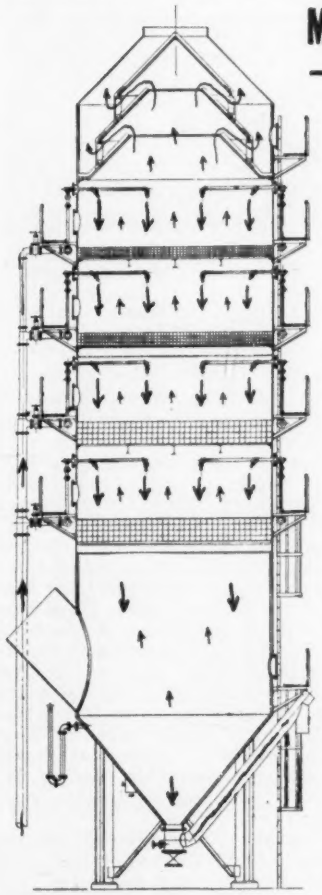

Light Arrow indicates the passage of gas. Heavy Arrow indicates the flow and distribution of water through the washer.

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★ Washes thoroughly

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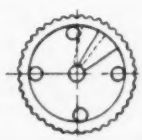

Top view of Spiral Tile shows holes which permit water to thoroughly wet the under side. Cross-section view of tile shows improved water distribution.

The Seaver moisture eliminator at the top consists of glazed elements and presents a large expanding area which reduces the velocity and requires the gas to turn 180° to reach its exit. This eliminates a large percentage of the moisture which contains dirt. This moisture is then deposited through holes on the lower tile banks to again do useful work.

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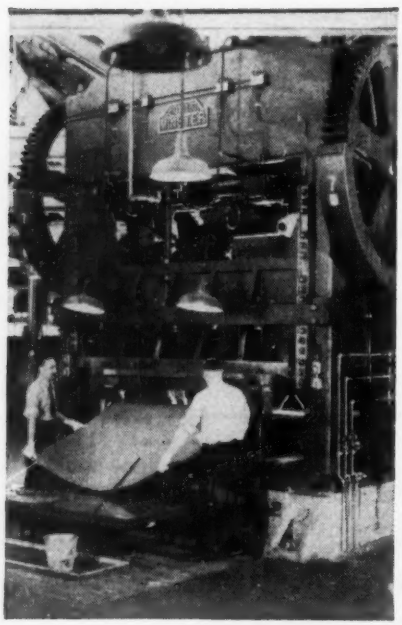

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Pig Iron . . .

Pig Iron Prices, Page 124

Buffalo — While merchant iron producers report little change in overall demand, there are instances of easier tendencies among foundries. Symington-Gould Corp. is shutting down its Rochester casting plant, which employs between 300 and 400 workers. Symington explained that "upon termination of the war it was anticipated that a satisfactory volume of domestic business in miscellaneous steel castings would develop and that considerable export business would be available. Our expectations in both of those fields have not materialized and it has been impossible in a highly competitive field to maintain prices on a level with increasing costs. Export business did not develop."

This action followed recent elimination of the night shift at one of American Radiator's local plants. Despite these curtailments, pig iron sellers look for an additional rush of orders when the Marshall Plan becomes effective. Interest centers in one of the earliest openings of the navigation season on record as a dozen freighters are headed for the upper lakes to carry the first loads of ore in a year which is expected to break all previous tonnage totals.

New York — Pig iron shipments last week did not reflect the walk-out at many of the coal mines, but those of beehive coke did almost immediately. This affected the melt at some foundries which over recent weeks have been forced to rely more on this material because of the shortage of oven coke. However, the overall effect was relatively small. In most cases foundries had a little beehive on hand to tide them over for the time being. Oven coke shipments continued much the same, as producers had close to a month's supply of coal on hand.

Boston — By maintaining a high ratio of scrap in melts, most foundries manage to keep on production schedules rather closely, although short of pig iron. Many innovations in melting practice are forced on foundry operators and rejections are high on some types of castings. Some have reached the point where an increase in the iron ratio is imperative, if current activity is to continue. Melters of basic iron are in the same straits and are using a grade of iron which normally would not be taken in. They are also forced to manipulate melting practice to maintain quality, but meet with doubtful success in some instances.

Pittsburgh — Continued scarcity and relatively high price of cast scrap have prevented many foundries from offsetting inadequate iron supplies. Merchant pig iron output here is estimated to represent less than 60 per cent of stated requirements, while considerable tonnage from outside districts no longer is shipped into this area. Foundry coke supply also is tight, but does not represent such a pressing problem as pig iron. Lone merchant producer here expects the pig iron shortage to become more acute over the coming months, despite reports of slight easing in order backlogs among some of the gray iron foundries. No definite decision has been reached in regard to whether or not pig iron sellers will be subject to meeting preferred tonnage directives for key industrial groups, such as the railroad car program, farm implements and housing. Most pig iron sellers are against establishment of any allocation program to meet these so-called essential needs.

Philadelphia — With possibly a month's supply of coal on hand, eastern pig iron production may weather the present work stoppages at the mines without serious curtailment. Some leading coal consumers look for these stoppages to continue through Easter and Mitchell day, with the men returning to the pits around Apr. 5, a suspension of about three weeks. However, if it appears that the mines would be down longer, a tapering in pig iron production in the East might become apparent before the end of the second week, but an effort is going to be made to keep furnaces producing as long as consistent with sound operating practice.

Cleveland—Coal strike's first effect on foundries is expected to be curtailment of already meager receipts of pig iron. Foundries will quickly feel any cessation in blast furnace operations. Another effect will be a drop in quality of coke because producers soon will have to dip into stockpiled coal which, through its exposure to weather, will produce a lower-grade coke. To foundries this means increased coke consumption and higher metal losses.

Republic Steel Corp., which gears its pig iron prices at Cleveland and Buffalo to prices of No. 1 heavy melting steel scrap at those points, quoted no price change last week at Cleveland but a $1 decline at Buffalo.

Chicago—Foundries continue to suffer from shortage of pig iron and coke and foresee no early relief. Coke deficiencies were on their way to being alleviated with the coming of warmer weather and the lessened strain on the nation's fuel supply, but the coal mine work stoppage appears ominous unless miners return to the pits soon. Foundries also fear that some of their backlog of castings may evaporate through cancellations from customers. Inventories of certain lines of hard goods are building up and consumers are not spending money as freely as recently.

Cincinnati—Shipments of foundry iron into this district continue restricted, holding the melt to a point far below castings demand. Some foundries are turning down proffers of heavy castings orders, preferring to devote what raw materials are available to lighter patterns. American Rolling Mill Co. has cooled a blast furnace at the Hamilton Coke and Iron Division for relining. No merchant iron is produced there.

Birmingham — Pig iron output, already substantially below current needs of the district, now faces a new threat in the coal strike. Best information is that an average of from five to six weeks coal supply is above ground. Iron users are turning heaven and earth, as usual, for supplies.

No. 2 blast furnace of Tennessee Coal, Iron & Railroad Co. at Ensley has come off for repairs which will require about 45 days for completion. The removal is in no manner connected with the coal strike. This leaves eight company blast furnaces in production.

Scrap . . .

Scrap Prices, Page 128

Chicago — Scrap activity here continues light, with the prices firmer. With the coal mine walkout curtailing steelmaking operations, there is no indication as to when mills will start new buying. Receipts have returned to their normal volume, and in several cases intake exceeds consumption. Within a few days old contracts reach their expiration date, and there is no indication as yet whether mills will grant extension or cancel unshipped tonnage as has been customary. Another week is necessary before it can be determined what effect the coal situation will have on scrap. Foundries have been buying little, but are commencing to show more interest.

Pittsburgh — Coal mine "walkout" has had no immediate effect on open-hearth quotations or the supply-demand relationship. The strike could have either a beneficial or tightening effect on the scrap supply position, dependent on the duration of the shutdown and whether the mills immediately curtail steelmaking operations or attempt to sustain production schedules through use of a higher scrap charge in relation to hot metal. If the latter course is followed, a sharp reversal in scrap inventory trend is inevitable, with consequent tightening in overall supply and possible upturn in prices resulting. In recent weeks the mills have been able to augment scrap stocks, despite high operating schedules. More open weather has stimulated collection and segregation efforts, making it possible for dealers and brokers to meet large tonnage commitments accepted during January and February. Considerable tonnage is still outstanding on these contracts, said to be one of the major reasons no weakness in open hearth grades has developed here. Renewed price strength is noted for cast grades, with bulk of tonnage reported moving in price range of $64 to $65, up $2 to $3 a ton over levels reported earlier this month.

New York—Despite coal mine stoppages, pressure for steel scrap continues. However, one leading Pittsburgh buyer has advised brokers that if coal operations continue suspended over the remainder of the month with no immediate settlement in sight he will either start curtailing or will continue to take in tonnage, but at $2 under the current market to cover cost of special storage. Meanwhile, eastern consumers show no indication of slackening their efforts to get steel scrap. Unless suspension of coal mining operations is unusually prolonged indications are they will continue to take in all the scrap offered, and presumably at the going market as storage represents no particular problem. Brokers' buying prices are unchanged on virtually all grades.

Boston — Heavy melting steel scrap prices are steadier at formula levels, but earlier dealings at higher prices have tended to maintain quotations. Machine shop turnings and short shovel turnings are in line with other grades as regards differentials. The peak in cast iron scrap prices for the time being apparently was reached two weeks ago, but the reaction has been slight and the market has leveled off, although most of

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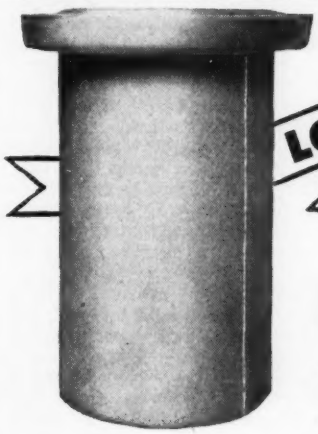

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the larger melters have larger inventories.

Philadelphia — Steel scrap prices have not been strengthened by the tense international situation. In fact, at the moment prices are on the soft side. Should the tightening in the defense program lead to a resumption of price control, prices may be fixed at lower levels but not as low as when the OPA last functioned. Hence, there is no disposition to hold scrap for higher prices on the assumption of greater stringency later in year. At the same time, current talk of more rigid defense requirements is not regarded as contributing to the present easier tone of the market.

Cast iron scrap prices would likely be hit the hardest if price control appears definitely in the offing.

All grades of scrap are unchanged, except No. 1 wheels which are higher at $67 to $68, delivered. Shortage of gondolas is retarding the movement of scrap.

Buffalo — Steadier price tone prevailed in scrap last week as two of the leading mills bought at the pricing formula. Fact that both sides were willing to negotiate new business on the basis of $39.75 a ton for No. 2 heavy melting and bundles indicates that the market is leveling off at the formula basis. Turnings were also included in new sales, changing hands at $34.75. A number of small sales were reported with one transaction involving 5000 tons. An easier tone was noted in specialties. An increased supply of short cut structurals, moving as low phos, knocked the price on the latter down to as low as $44.75, but sales were reported also as high as $48.

A bit of tension has been injected into the market by conditions abroad. While mills are in urgent need of scrap to maintain capacity operations, dealers are hesitant about holding back materials because of the possibility that controls might return.

Cleveland — Tendency toward price weakness continued in scrap here last week, although no drops below formula prices on steelmaking grades were reported. Increasing resistance to high prices and an improved flow of scrap gave relief even in the extremely tight foundry grades, all cast iron grades being down $2 a ton. Likewise, railroad malleable and angles and splice bars were off $2.

Performance of the scrap market hinged largely on speculation on the duration of the coal miners' work stoppage.

Cincinnati—Scrap prices are unchanged with uncertainty seen in the market undertone. Foundry grades are considerably weaker on refusal of melters to accept, as heretofore, offerings above acknowledged levels. Besides the buying hesitancy, there is an effect from an upturn in the flow of material into dealers' yards, at times straining facilities for preparation. Mills are accepting scrap steadily at the formula.

St. Louis — Steel scrap is becoming noticeably easier, but better supplies are not reflected in prices. Offerings by brokers are increasing, but reductions in quotations are slight and spotty. A few sales have been reported in which miscellaneous grades were down $1 to $2; short rails, $1. Cast scrap is getting scarce again.

Seattle — Mills report the steel scrap situation somewhat easier, probably due to better weather, facilitating shipments from the country. The price is firm at $24, mill buyers denying premium purchases. Independent dealers view the market pessimistically expressing the opinion that the supply situation is likely to grow worse, with demand much greater than in the prewar period and supply sources augmented only by ship breaking. Recently 250 tons prepared heavy melting steel scrap was sold by the Navy to a local dealer at $28 gross and another 150 tons will be sold by the Navy Mar. 24. Some eastern interests are said to be watching this market closely. Dealers state they have no difficulty in selling No. 1 heavy melting at $28 gross, Nos. 1, 2 and 3 bundles, $30; machine shop turnings, $16.50, stove plate, $26 to $28; cut structurals, $26 to $28.

Cast iron scrap is increasingly in demand with foundries unable to obtain quotas of pig. Local buyers have set $40 as their maximum offer but eastern buyers are in the market freely offering up to $45, fob Seattle. Cleveland and Detroit are the points to which these shipments are most frequently sent, the supposition being that this scrap is for the automotive industry. Dealers state that charging box cast can easily bring $35 to $40 and clean auto cast the same price levels.

Refractories . . .

Refractories Prices, Page 124

Pittsburgh — Some progress has been made in reducing refractory order backlogs. Deliveries of special shape silica coke oven brick are extended 5 to 6 months, while shipments of standard sizes generally are available in 3 to 4 weeks. Production schedules were well sustained this winter due to installation of fuel oil stand-by equipment last year. Demand likely will continue heavy throughout this year, although there is some indication of holding up of large scale expansion programs. One seller reports at least two new batteries of by-product coke ovens are to be awarded in the near future. Harbison-Walker Refractories Co. expects to start partial operation of its new plant at Fulton, Mo., about the middle of this year. Company's overall production has been substantially increased in recent months, reflecting output of the new plant in Baltimore and modernization of other facilities.

ASTE Show Reveals Latest Tooling

(*Continued from Page* 38)

count for anything.

Officers of the ASTE for 1948-49 were elected as follows: President, I. F. Holland, superintendent, Small Tool & Gage Department, Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford, Conn.; 1st vice president, R. B. Douglas, president, Godscroft Industries Ltd., Montreal, Can.; 2nd vice president, Herbert L. Tigges, vice president, Baker Bros., Inc., Toledo, O.; 3rd vice president, V. H. Ericson, vice president, Johnson de Vou, Inc., Worcester, Mass.;

treasurer, George A. Goodwin, chief process engineer, Master Electric Co., Dayton, O.; secretary, William B. McClellan, sales engineer, Gairing Tool Co., Detroit.

February Steel Production Sets New Peacetime High

Steel production in February set a new peacetime record for the month and topped the February, 1947, output by 518,591 tons, according to the American Iron & Steel Institute, New York. Output was only 253,358 tons below the all-time February high recorded in 1944.

Production totaled 6,940,653 tons of ingots and steel for castings in February, 1948, compared with 6,422,062 tons in the like 1947 month and 7,194,011 tons, the wartime high for the month established in 1944. Last month's output included 6,246,472 tons of openhearth, 340,596 tons of bessemer, and 353,585 tons of electric steel ingots and steel for castings.

The steel operating rate during February, 1948, averaged 93 per cent of capacity, as against 91.7 per cent of the smaller capacity existing a year ago.

The average weekly output during February, 1948, was 1,676,486 net tons, compared with 1,605,515 tons for the similar month of 1947.

Farm Implement Makers Decline Allocations Aid

(*Concluded from Page* 41)

merce officials early this week to discuss possibility of the warehouses coming into the voluntary steel allocations program. Such participation has been under consideration by the Office of Industry Co-operation as possibly contributing to solution of the small steel buyers' supply problem. In event the proposal is acted upon favorably the first move will be to appoint an industry advisory committee.

The pig iron industry advisory committee last week reported it was making progress on a program of pig iron allocation for the freight car builders. These latter have asked present allotments be upped to 35,000 tons monthly. However, it is understood the committee is disinclined toward upping the allotment without exhausting all possibilities of obtaining scrap. The suggestion is made that the railroads immediately return available scrap to the makers of car wheels who are in need of raw material. Such action, it is said, would relieve the pig iron producers of some of the supply burden now confronted.

Petroleum Industry Needs — Continued rapid growth in demand for petroleum products makes it important that steel be available in sufficient quantities for equipment urgently needed by the petroleum industry if hardships are to be avoided in the next few years, said Walter S. Hallanan, chairman, National Petroleum Council, in a report of the Council's Committee on Petroleum Industry Steel Requirements prepared in connection with the voluntary steel allocations program.

To meet estimated petroleum demands, total direct and indirect requirements for the petroleum industry, is placed at 15,571,500 tons for the 18 months Apr. 1, 1948, to Sept. 30, 1949. Requirements of steel forgings and castings total 951,984 tons for the 18-month period.

Steel requirements are listed as follows: For oil and gas production, oil pipelines, refining and marketing plant facilities, 7,707,900 tons for the 18-month period; for natural gas transportation from the gathering systems up to the city gate, 2,191,900 tons. In addition there are essential needs for allied phases of the industry's operations, but steel used therein is largely charged to other industries. For instance, total steel needs are estimated at 1,496,600 tons for the 18-month period for containers; 1,120,400 tons for tankers, barges, tank cars, and truck tanks; 1,340,300 tons for consumer storage.

Steel for projected operations in foreign activities is estimated at 1,714,400 tons for the 18-month period.

Requirements of the petroleum industry for domestic and foreign operations were reported as follows in short tons on a quarterly basis for specific products:

Products	1948			1949		
Quarters	Second	Third	Fourth	First	Second	Third
Structural Shapes	130,213	148,064	149,404	137,434	147,126	136,096
Carbon Bars	72,128	80,769	82,950	68,554	76,739	80,416
Sheets, H-R, 16 Gage and heavier	193,171	198,286	196,587	190,037	197,378	200,806
Sheets, C-R & H-R, P & O, 17 Gage	256,775	256,893	172,281	195,229	291,131	291,018
Sheets, Galvanized	3,897	4,049	4,007	3,825	3,920	3,299
Plates	482,442	527,335	535,435	519,668	536,496	527,617
Oil Country & Pressure Tubing						
Carbon	342,750	387,486	399,814	326,934	363,217	400,690
Alloy	76,214	86,722	89,883	74,016	81,986	89,334
Line Pipe	881,576	1,044,854	867,331	898,847	948,861	976,106
Misc. Steel Products	22,461	22,575	22,999	23,047	21,592	20,867
Total Steel Mill Products	2,461,627	2,757,033	2,520,691	2,437,591	2,668,446	2,726,249
Forgings and Castings	148,946	169,775	167,700	149,315	156,826	159,422
Grand Total	2,610,573	2,926,808	2,688,391	2,586,906	2,825,272	2,885,671

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Quick, easy, push-button control featured by Kinnear Motor Operated Rolling Doors gives you a tighter grip on *all* door costs. It helps cut heating and air-conditioning costs through prompt, rapid closing of doors. It saves time and steps (you can have any needed number of additional controls at remote points). It avoids traffic bottlenecks at doorways, and along with these operating advantages, you get the extra durability, protection and space-saving efficiency of these rugged, all-steel doors with their world-famous coiling upward action.

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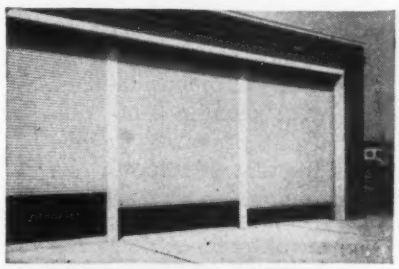

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hot-dip GALVANIZING

Canada . . .

Toronto, Ont. — Following the closing of books for second quarter orders, business in Canadian iron and steel markets has slipped back into its former routine groove. Advancing prices that have been reported in the United States recently have not affected Canadian steel prices which continue under ceiling control. With the exception of pig iron, no cuts in quota deliveries have been announced to this time, but there is a possibility that Canadian steelmakers may have to spread their output over a larger number of consumers now that import restrictions on structural shapes and machinery have gone into effect.

Demand for steel plate is expanding steadily and domestic producers are being hard pressed to meet requirements even with large imports. Railroad rolling stock builders and shipbuilding plants are seeking larger tonnages of plate and other lines of steel to maintain operating schedules on the big orders that have been booked and assure capacity operations well into 1949.

There has been no easing in supply of steel sheets, some consumers stating their quotas fall far short of meeting demands. Warehouse operators also report excessive demand for black and galvanized sheets, and small lot buyers are taking all their available supply almost as soon as it is received.

Production of carbon bars has been stepped up somewhat, but despite this fact, no surplus stocks are reported. Mills are holding consumers and warehouses to their monthly quotas on delivery. Most barmakers now are booked through to the end of June.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

31,000 tons, superstructure, Mystic river bridge, Boston; 17,000 tons, Big Mystic crossing and Charlestown approach, to American Bridge Co., 14,000 tons, Little Mystic crossing and Chelsea approach, to Bethlehem Steel Co.

10,140 tons, power house, Consolidated Edison Co., 14th St., New York, to American Bridge Co., Pittsburgh.

1400 tons, slag and skull cracker building, Ford Motor Co., Dearborn, Mich., to American Bridge Co., Pittsburgh.

575 tons, building, Reece Corp., Waltham, Mass., to Bethlehem Steel Co.; Stone & Webster Engineering Corp., Boston, contractor-engineer.

1500 tons, factory building, Beau Knit Mills Inc., Childersburg, Ala., to Bethlehem Steel Co., Bethlehem, Pa.

1500 tons, miscellaneous requirements, power house, Pennsylvania Power & Light Co., Sunbury, Pa., through Ebasco Services, New York, to Bethlehem Steel Co., Bethlehem, Pa.

1150 tons, stockhouse, Schaeffer Brewery, Brooklyn, N. Y., through Turner Construction Co., to Bethlehem Steel Co., Bethlehem, Pa.

1000 tons, United States Post Office, garage and services, Brooklyn, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

700 tons, parts building, Electro-Motive Division, General Motors Corp., LaGrange, Ill., to Joseph T. Ryerson & Son Inc., Chicago.

450 tons, building, James Lees & Sons, Glasgow, Va., to Belmont Iron Works, Eddystone, Pa.

365 tons, building, Smith Carpet Co., Chicago, through Turner Construction Co., to American Bridge Co., Pittsburgh.

300 tons, plant addition, Mack Truck Co., Plainfield, N. J., through Wigton-Abbott Corp., that city, to Bethlehem Construction Co., Bethlehem, Pa.

300 tons, Washington state Medical Lake hospital addition, to Isaacson Iron Works, Seattle.

265 tons, Abramsons department store, warehouse, 37-02 Main St., Flushing, N. Y., to Grand Iron Works, New York.

250 tons, mill building, awarded through J. P. Hallahan, Philadelphia, general contractor, to Bethlehem Steel Co.

225 tons, foods building, Penn State College, Penn State, Pa., to Bethlehem Steel Co.

215 tons, boiler supports in connection with work under way by the Combustion Engineering Co., at Miami, Fla., through Wigton-Abbott Corp., Plainfield, N. J., to Ingalls Iron Works, Birmingham, Ala.

200 tons, Veterans Administration building, Wilmington, Del., to Lehigh Structural Steel Co., Allentown, Pa.

196 tons, water works, Evanston, Ill., for city, to Wendnagel & Co., Chicago; S. N. Nielsen Co., Chicago, contractor.

195 tons, building, Champion Lamp Works, Lynn, Mass., to Lehigh Structural Steel Co., Allentown, Pa.

195 tons, apartment house, Yellowstone Boulevard, between 67th Road and 67th Drive, Forest Hills, New York, to Grand Iron Works Inc., New York.

170 tons, building, Consumers Co., Muskegon, Mich., to Hansell-Elcock Co., Chicago.

120 tons, addition, Roosevelt Hospital, Manhattan, New York, through Vermilya-Brown Co. Inc., to Dreier Structural Steel Co. Inc., Long Island City, N. Y.

100 tons, United States Engineers dam, Unadilla, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

STRUCTURAL STEEL PENDING

3200 tons, state bridge, Augusta, Me.; bids about Apr. 15.

1150 tons, Westchester Ave., viaduct, New York City Board of Transportation, Bronx, New York, bids Apr. 2.

1000 tons, five buildings, State Department of Properties & Supplies, Harrisburg, Pa., bids Mar. 31.

770 tons, state bridge work, Trenton, N. J.; Kaufmann Construction Co., Philadelphia, general contractor, low bidder.

525 tons, three bridges, Pennsylvania railroad, Baltimore; bids Mar. 25.

390 tons, state bridge, Route 69, at West river, Woodbridge, Conn., bids asked.

305 tons, state bridge, West Moreland county, Franklin and Salem townships, Pennsylvania, bids Apr. 2.

300 tons, T-hangars and shops, Southwest Municipal Airport, Philadelphia; bids Mar. 29.

180 tons, state bridge, Salem township, West Moreland county, Pennsylvania, bids Apr. 2.

180 tons, state bridge, Butler and Lawrence counties, Pennsylvania; bids Apr. 9.

165 tons, including reinforcing, Washington state girder bridge, Skagit county; bids to Olympia, Mar. 26.

150 tons, Washington state undercrossing, King county; M. P. Butler, Seattle, low $30,722.

125 tons, Mendenhall Glacier bridge, Alaska; R. J. Sommers, Juneau, Alaska, low to Public Roads Administration, $93,071.

125 tons, building, Salvation Army, Chicago.

100 tons, plus 3442 square feet of steel beam bridge flooring, state bridge work, Independence township, Beaver county, Pennsylvania, bids Apr. 2.

Miscellaneous tonnage, including 1850 square feet of open type steel beam bridge flooring, 1791 square feet of steel bridge flooring of another type and 75 tons of plain structural steel, state work, Orwell and Pike townships, Bradford county, Pennsylvania, bids Apr. 2.

Unstated tonnage, seven 17-story apartments, Governor Smith housing development, lower east side, Manhattan, New York, bids to be

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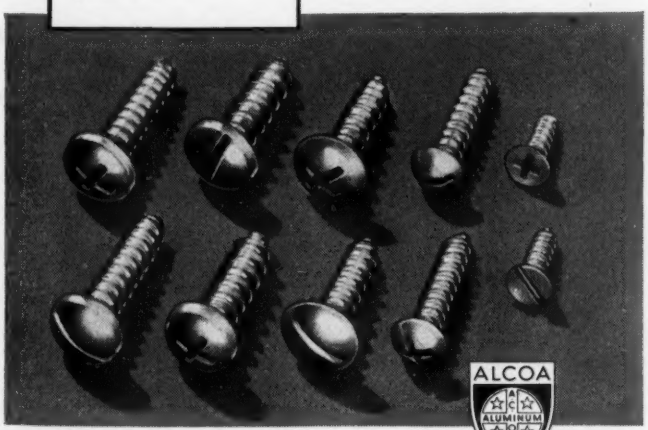

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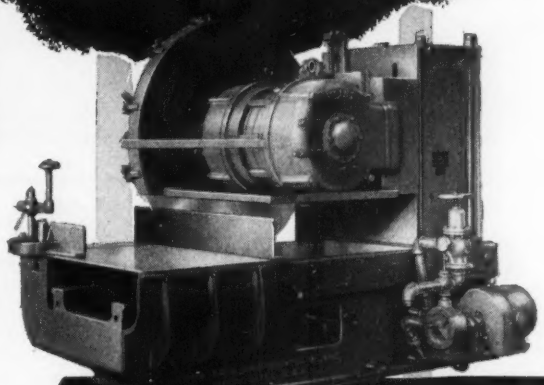

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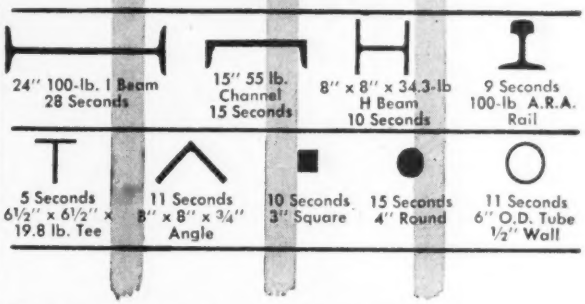

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closed by the Municipal Housing Administration, Mar. 23.

Unstated tonnage, department store, Consumers Distributing Corp., Irvington, N. J., bids closed March 18.

Unstated, galvanized steel transmission towers; bids to Bonneville Power Administration, Portland, Oreg., Mar. 23; spec. 4146.

Unstated, six 12 x 18 foot radial gates for Grand Coulee project; bids to Bureau of Reclamation, Denver, April 20.

REINFORCING BARS . . .

REINFORCING BARS PLACED

350 tons, apartment building, Chicago, to Joseph T. Ryerson & Son Inc., Chicago; Carl E. Erickson Co., Chicago, contractor.

REINFORCING BARS PENDING

700 tons, Washington State College library, Pullman; Henry George & Sons, Spokane, low $2,138,539.

383 tons, building extension, West-Southwest Sewage Treatment Works, Div. "Rb", Sanitary District of Chicago; bids Apr. 1.

300 tons, addition to Port of Tacoma cold storage plant, J. G. Watts Construction Co., Tacoma, low basic $723,533.

293 tons, state bridge work, Salem township, West Moreland county, Pennsylvania, bids Apr. 2.

233 tons, state bridge work, Franklin and Salem townships, West Moreland county, Pennsylvania, bids Apr. 2.

Unstated, addition to Veterans' hospital, Portland, Oreg., Del. E. Webb Construction Co., Los Angeles, low $2,562,952.

Unstated, press and bindery building, Cuneo Press, Chicago.

Unstated, Goldblatt Memorial Hospital, University of Chicago, Chicago; bids Mar. 31.

Unstated, Silver Cross Hospital, Joliet, Ill.; Hansen & Petersen Co., Joliet, Ill., contractor.

PIPE . . .

STEEL PIPE PLACED

Unstated, 30 miles for Lewiston, Idaho, Orchards irrigation system, to Armco Drainage & Metal Products Co., Portland, Oreg., low $266,886.

STEEL PIPE PENDING

Unstated, 8,400 ft. 12 inch; bids in to Alderwood Manor district, Seattle.

CAST IRON PIPE PENDING

275 tons, 8 and 12 inch, for Seattle water department; bids Mar. 17.

130 tons, 6 and 8 inch class C., bids to Ellensberg, Wash., Mar. 15.

RAILS, CARS . . .

RAILROAD CARS PLACED

Chicago, Milwaukee, St. Paul & Pacific, 36 trolley coaches, to Marmon-Herrington Co. Inc., Indianapolis.

Southern Pacific, 9200 freight cars; 3350 fifty-ton box cars, to Pullman-Standard Car Mfg. Co.; 1000 fifty-ton drop-bottom gondolas, to Bethlehem Steel Co.; 650 fifty-ton drop bottom gondolas to own shops; 1500 seventy-ton flat cars, 600 fifty-ton flat cars and 700 fifty-ton gondolas and 400 seventy-ton covered hoppers to American Car & Foundry Co., New York; 1000 fifty-ton drop-bottom gondolas, to General American Transportation Co., Chicago.

LOCOMOTIVES PLACED

Bessemer & Lake Erie, one 1000-horsepower and two 1500-horsepower diesel-electric switch engines, to Baldwin Locomotive Works, Eddystone, Pa.

Chicago, Rock Island & Pacific, ten 1500-horsepower diesel-electric locomotives, to the Electro-Motive Division, General Motors Corp., La Grange, Ill.

Norfolk Southern, three 600-horsepower diesel-electric road-switch engines, to the General Electric Co., Schenectady, N. Y.

CONSTRUCTION AND ENTERPRISE

COLORADO

DENVER—Public Service Co. of Colorado, 15th and Champa Sts., will build a $14,350,000 steam power plant on a 50-acre site at W. Vassar Ave. and S. Navajo St.

KANSAS

GARDEN CITY, KANS.—Stanolind Oil & Gas Co. has decided to build an $80 million natural gasoline plant here. Completion of the facility is set for January, 1950.

KENTUCKY

LE JUNIOR, KY.—Silver Star Coal Co., c/o Guy B. Darst, plans construction of a coal tipple, head house and other equipment costing $100,000.

LOUISVILLE, KY.—Texas Gas Transmission Corp. and Kentucky Natural Gas Corp., c/o W. T. Stevenson, Owensboro, plan contruction of a $60 million pipe line to bring gas from Texas to Louisville and other Kentucky communities.

MOUNTAIN, ASH. KY.—B. & H. Blue Gem Coal Co., c/o O. W. Robinson, plans construction of a tipple, head house and other buildings costing $75,000.

NEWPORT, KY.—International Detrola Corp., Newport Rolling Mill Division, c/o J. E. Maloney, has selected Swan Construction Inc., W. 71st St., Cincinnati, as engineer for the conversion of the recently acquired electric furnace steel plant into an open hearth facility.

LOUISIANA

BATON ROUGE, LA. — Gulf Refining Co., Gulf Bldg., Houston, Tex., plans to build a $4 million gas conservation plant here.

BATON ROUGE, LA.—Ethyl Corp. received the low bid at $622,960 from Caldwell & McCann, Triad Bldg. for a laboratory and pilot plant building.

EUNICE, LA.—Kelly, Weber & Co., Lake Charles, has awarded a $130,000 contract to Albert Tate & Associates, Ville Platte, for construction of a fertilizer plant.

NEW ORLEANS, LA.—Gulf Refining Co., Gulf Bldg., Houston, Tex., plans a $2,600,000 project on the marshes between New Orleans and mouth of the Mississippi. Project includes a dehydration plant, crude oil lines and high pressure compressors.

SHREVEPORT, LA.—United Gas Corp., M. C. McGowen, president, 1525 Fairfield, plans a $26 million project consisting of development of gas and oil fields.

MINNESOTA

SHAKOPEE, MINN.—Alloy Metals Co., 1000 Berry St., has awarded a $125,000 contract to a A. Cederstrand Co., 966 Central Ave., Minneapolis, for construction of a factory.

ST. PAUL—Bechik Products Co., 786 University Ave., will build a $100,000 factory and office on Eustis St.

MISSOURI

ST. LOUIS—John Nooter Boiler Works, 1401 S. Second St., has awarded a $70,000 contract to Fruin-Colnon Construction Co., 1706 Olive St., for construction of a plant at 117 Miller St.

ST. LOUIS—Monsanto Chemical Co., 1700 S. Second St., has awarded a $300,000 contract to Gamble Construction Co., 304 Pine, for a mechanical shop.

ST. LOUIS—Mines Equipment Co., 4215 Clayton Ave., has awarded a $70,000 contract to Woermann Construction Co., 3800 W. Pine Blvd., for erection of a barjoist plant.

ST. LOUIS—Keyen Co., 700 S. Spring Ave., has awarded a $100,000 contract to Mississippi Valley Structural Steel Co., 3117 Big Bend Blvd., for the design and erection of a 1-story plant addition.

ST. LOUIS—W. N. Matthews Corp., 3722 Forest Park Blvd., has awarded the general contract for construction of a 1-story factory at 3850 Delor St. to Gamble Construction Co., 804 Pine St. Owner manufactures electric equipment.

NEBRASKA

HAVELOCK, NEBR.—Patriot Body Shop plans to build a $150,000 plant.

NEW JERSEY

PLAINFIELD, N. J.—International Plainfield Motor Co., 935 S. Second St., has awarded a $1,500,000 contract to Wigton-Abbott Corp., 1225 South Ave., for a project to include factory additions, a motor testing building and other facilities.

NEW YORK

BROOKLYN, N. Y.—E. A. Laboratories Inc., 696 Myrtle Ave., has awarded a $500,000 contract to W. J. Barney Corp., 101 Park Ave., New York, for construction of a 5-story factory at 130 Sepncer St.

LONG ISLAND CITY, N. Y.—Truscon Steel Co., subsidiary of Republic Steel Corp., Cleveland, has awarded a contract to James Stewart & Co. Inc., New York, for construction of a $1,000,000 central distribution depot, office and warehouse at 48th St. and Northern Blvd.

OKLAHOMA

MUSKOGEE, OKLA.—Container Corp. of America, 38 S. Dearborn St., Chicago, will build a $250,000 plant here.

PENNSYLVANIA

ALLENTOWN, PA.—Charis Corp., 7301 Linden St., will build plant additions costing $175,000.

PITTSBURGH—Standard Oil Co. of Pennsylvania, 35th St., will build a $100,000 laboratory and warehouse at 34th and Smallman Sts.

TENNESSEE

RICHARDS CITY, TENN.—Pennsylvania Dixie Cement Corp., 60 E. 42nd St., New York, proposes to build a $500,000 plant addition.

CANADA

ALICE ARM, B. C.—Torbrit Siever Mines Ltd. plans to build a 300-ton cyanide plant, mill and power plant at a cost of more than $400,000.

WINNIPEG, MAN.—Winnipeg Electric Co., Notre Dame Ave., has awarded a $1,250,000 contract to Rayner Constructors Ltd., 29 Commercial Ave., Leaside, Ont., for erection of the superstructure of a power plant.

ST. THOMAS, ONT.—Erie Iron Works, 62 Moore St., will build a $250,000 plant, to include a welding section.

ST. THOMAS, ONT.—Timken Roller Bearing Co., Talbot St., will construct a $700,000 hardening plant here.

SUDBURY, ONT. — Toba Nickel & Copper Mines Ltd. plans a $100,000 mining development.

TORONTO, ONT.—Canada Zinc Mining Co. Ltd., c/o J. D. F. Ross, 66 King St., plans to develop a mine at a cost of $150,000.

TORONTO, ONT.—Engar Wheels Ltd., c/o G. Rull, 51 W. King St., will build a $100,000 plant for the manufacture of wheels.

TORONTO, ONT.—Gair Co. of Canada Ltd., 372 Bay St., plans to build a $3 million plant and office.

DUVERNY, QUE.—Southern Gold Mines Ltd., 85 W. Richmond St., Toronto, plans a diamond drilling project to cost $110,000.

VAL D'OR, QUE.—East Sullivan Mines Ltd., 1604 Aldred Bldg., Montreal, will build a $1,250,000 concentrating addition to increase capacity to 4000 tons.

SHERBROOKE, QUE. — Canadian Fairbanks, Morse Co. Ltd., Belvedere St., will build a $100,000 plant addition.

ST. JOHNS, QUE.—Cables, Conduits & Fittings Ltd., 63 Richelieu St., proposes to repair its plant at a cost of $150,000.